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EXCAVATING ENGINEER

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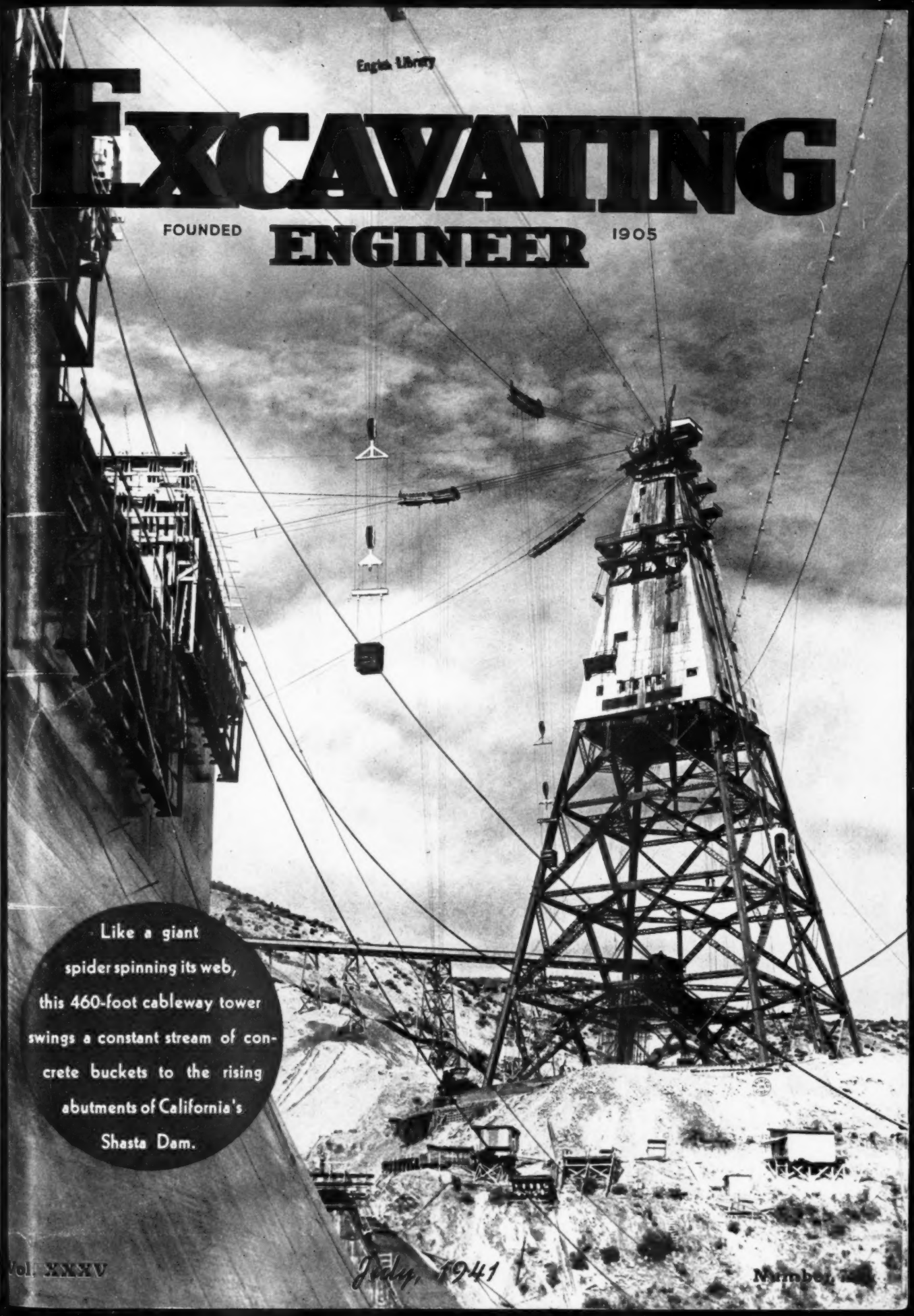


Like a giant spider spinning its web, this 460-foot cableway tower swings a constant stream of concrete buckets to the rising abutments of California's Shasta Dam.

Vol. XXXV July, 1941 Number

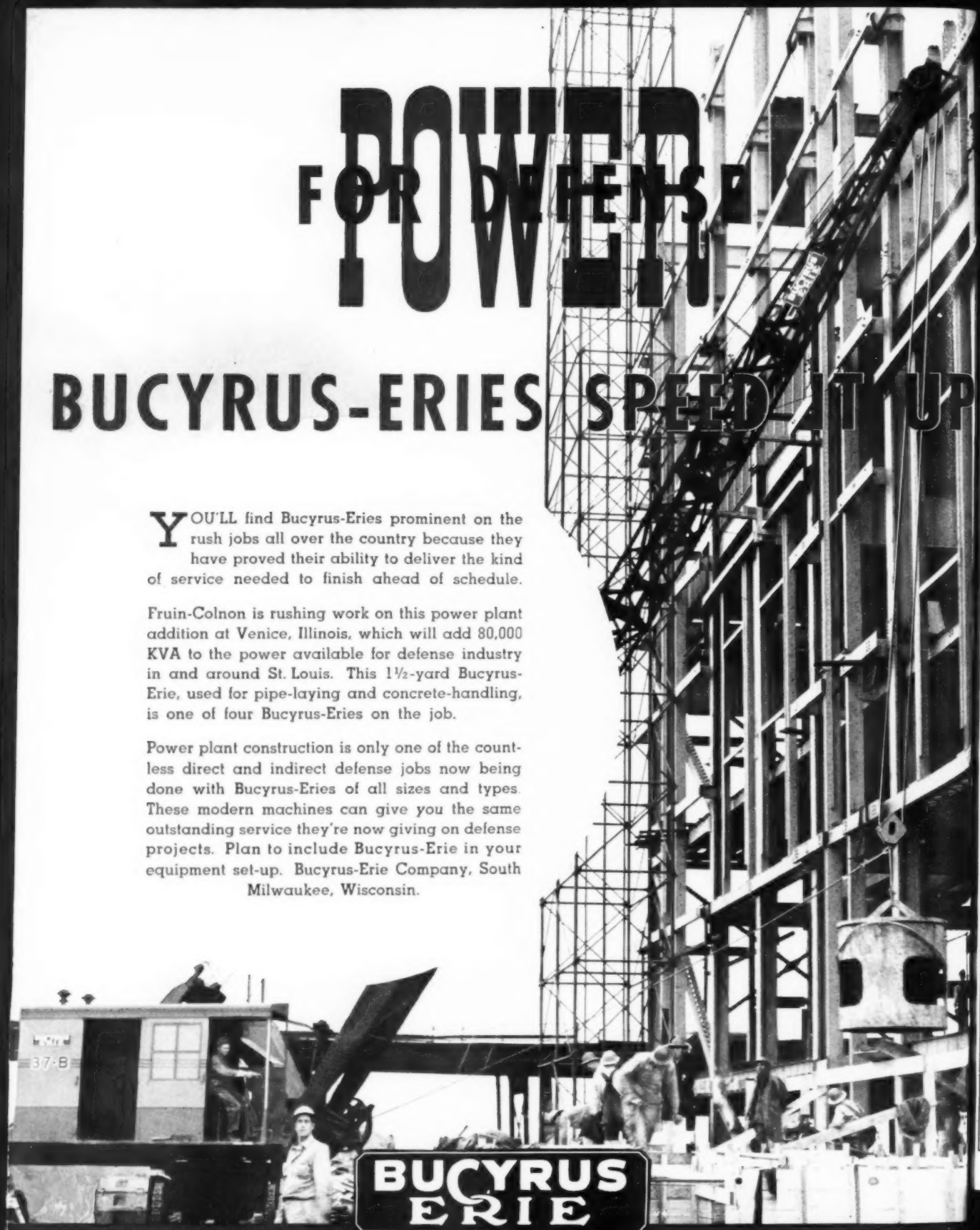
FOR DEFENSE POWER

BUCYRUS-ERIES SPEED IT UP

YOU'LL find Bucyrus-Eries prominent on the rush jobs all over the country because they have proved their ability to deliver the kind of service needed to finish ahead of schedule.

Fruin-Colnon is rushing work on this power plant addition at Venice, Illinois, which will add 80,000 KVA to the power available for defense industry in and around St. Louis. This 1½-yard Bucyrus-Erie, used for pipe-laying and concrete-handling, is one of four Bucyrus-Eries on the job.

Power plant construction is only one of the countless direct and indirect defense jobs now being done with Bucyrus-Eries of all sizes and types. These modern machines can give you the same outstanding service they're now giving on defense projects. Plan to include Bucyrus-Erie in your equipment set-up. Bucyrus-Erie Company, South Milwaukee, Wisconsin.



BUCYRUS ERIE

EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT

THE GROUNDWORK OF DEFENSE

EXCAVATING ENGINEER

FOUNDED 1905

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Over one million yards of concrete have already been placed in Shasta Dam by this huge cableway tower which sends out concrete in 16-ton bucket loads. Key structure of California's Central Valley project, the completed dam will contain over 6,000,000 yards of concrete.

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"2 MONTHS *ahead of schedule"*

ON THIS 35 MILLION DOLLAR JOB

SWEET NEWS—THE HUNKIN-CONKEY CONSTRUCTION COMPANY of Cleveland is 'way ahead of time on the big U. S. shell-loading plant at Ravenna, Ohio.

"With RPM DELO—breakdowns are no longer present"—that's their report on eleven Thew Lorain shovels and 87 other pieces of Diesel equipment working a 24-hour day in rock and shale—4 million yards of it. If you ever had Diesel trouble—look at this list—all 98 pieces RPM DELO lubricated—all working fine:

63 Caterpillar "Cats"
6 small Diesel locomotives (Caterpillars)
5 Northwest shovels (Murphy Diesels)
1 Marion Shovel
11 Thew Shovels (Caterpillar Diesels)
12 Air Compressors

There are 116 miles of railroad, 70 miles of highway and 900 buildings in the contract—but with RPM DELO on the job "former lubricating difficulties have disappeared."

"Two months ahead of schedule" is a quick way of saying RPM DELO—and no breakdowns! No sludge trouble—no ring-sticking—engine wear lower than ever before!

ORDER RPM DELO *Unequaled* FOR YOUR DIESELS

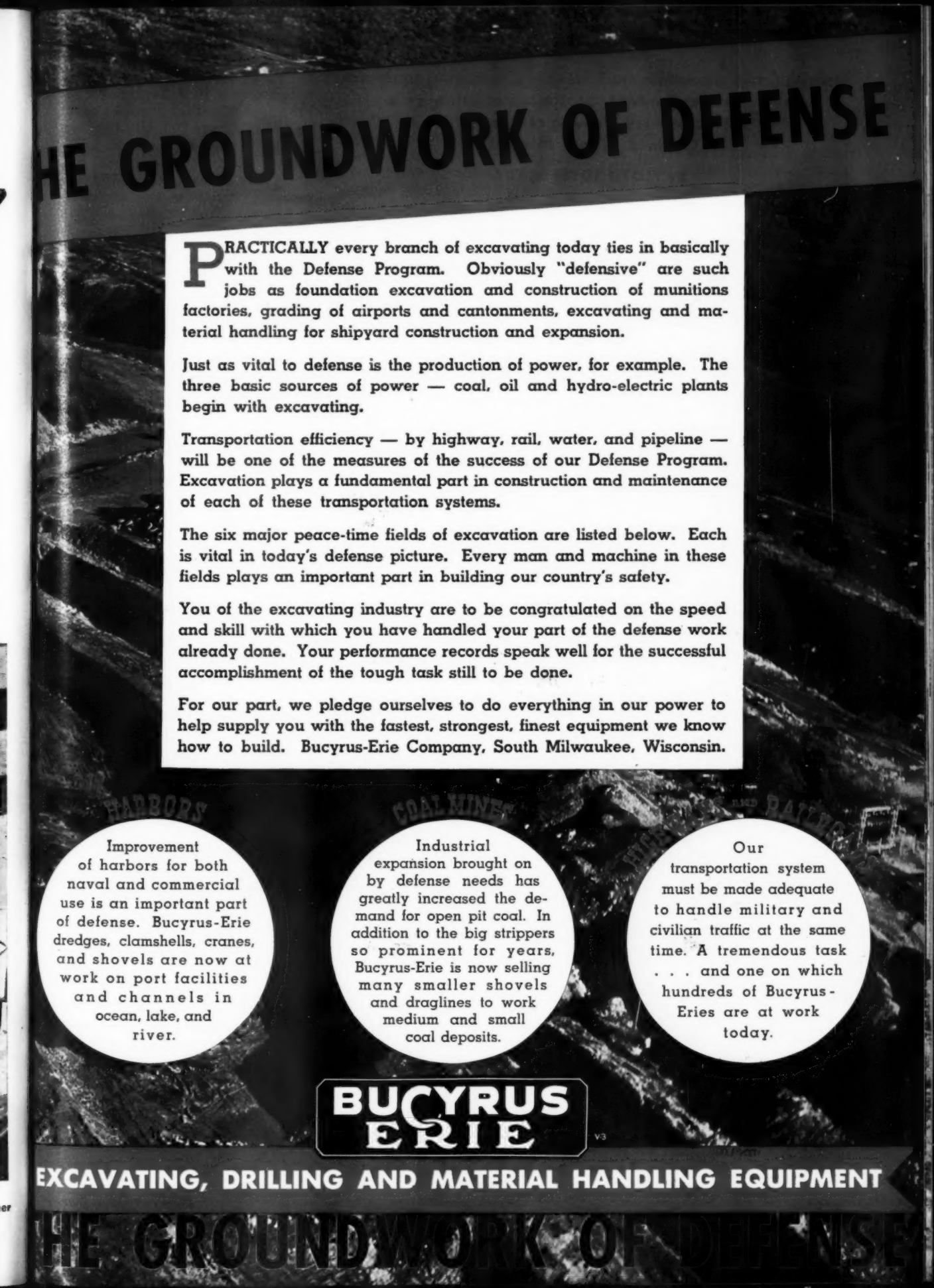
Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

RPM DELO
Kyso RPM DELO • Sohio RPM DELO
Signal RPM DELO • Caltex RPM DELO
Imperial RPM DELO

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

STANDARD OIL COMPANY OF CALIFORNIA

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.


HE GROUNDWORK OF DEFENSE
PRACTICALLY every branch of excavating today ties in basically with the Defense Program. Obviously "defensive" are such jobs as foundation excavation and construction of munitions factories, grading of airports and cantonments, excavating and material handling for shipyard construction and expansion.
Just as vital to defense is the production of power, for example. The three basic sources of power — coal, oil and hydro-electric plants begin with excavating.
Transportation efficiency — by highway, rail, water, and pipeline — will be one of the measures of the success of our Defense Program. Excavation plays a fundamental part in construction and maintenance of each of these transportation systems.
The six major peace-time fields of excavation are listed below. Each is vital in today's defense picture. Every man and machine in these fields plays an important part in building our country's safety.
You of the excavating industry are to be congratulated on the speed and skill with which you have handled your part of the defense work already done. Your performance records speak well for the successful accomplishment of the tough task still to be done.
For our part, we pledge ourselves to do everything in our power to help supply you with the fastest, strongest, finest equipment we know how to build. Bucyrus-Erie Company, South Milwaukee, Wisconsin.
HARBORS
Improvement of harbors for both naval and commercial use is an important part of defense. Bucyrus-Erie dredges, clamshells, cranes, and shovels are now at work on port facilities and channels in ocean, lake, and river.
COAL MINES
Industrial expansion brought on by defense needs has greatly increased the demand for open pit coal. In addition to the big strippers so prominent for years, Bucyrus-Erie is now selling many smaller shovels and draglines to work medium and small coal deposits.
Our transportation system must be made adequate to handle military and civilian traffic at the same time. A tremendous task . . . and one on which hundreds of Bucyrus-Eries are at work today.
BUCYRUS ERIE
V3
EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT
HE GROUNDWORK OF DEFENSE

Despite Ozark Mountain mud, modern dirt moving equipment has met its deadline on the completion of a 7th Corps Area training center at Fort Leonard Wood, Missouri

By FLOYD SUTER BIXBY

Beating General Mud

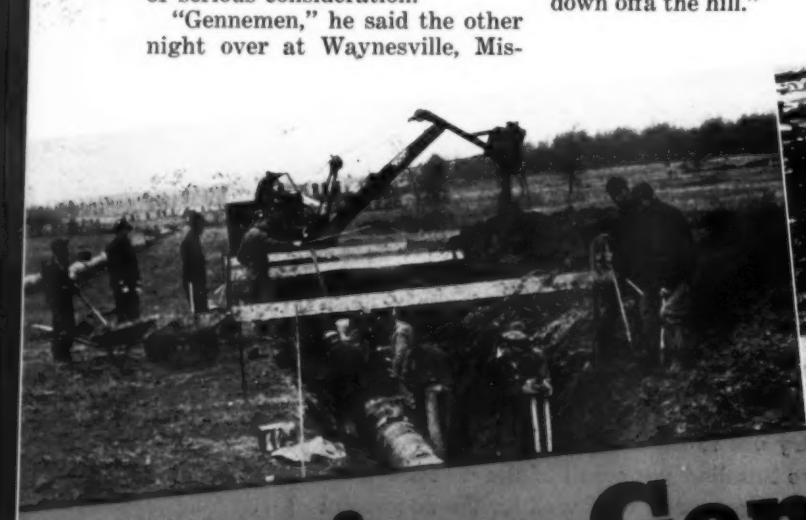
HOT STOVE philosophers in the Ozark country have something new to talk about these days. It's this defense business. Old Uncle Rufe Jacobson has given the matter a great deal of serious consideration.

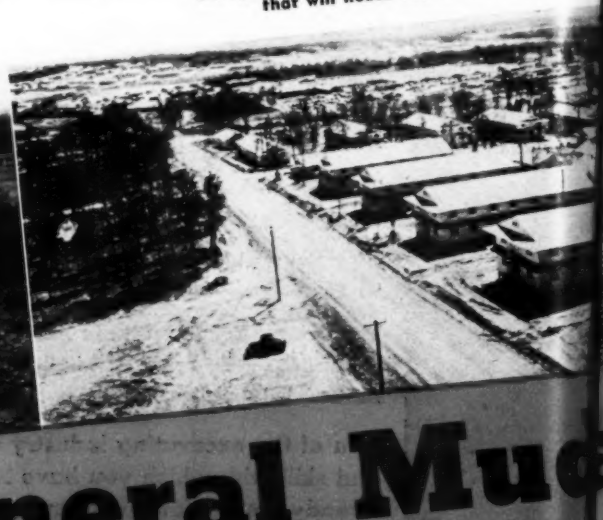
"Gennemen," he said the other night over at Waynesville, Missouri, "listen here. This here defense is somethin' that we gotta bear up with, that's all. If Roosevelt says she had to be done why that's good enough fer me. But by Hell, this big camp over in the park's a goin' to ruin a lot uh good coon huntin'. They tell me they seen the durn varmints migratin' down offa the hill."

That's about right, The coons and possums and everything else that a hound dog will tree have moved off the Fort Leonard Wood reservation near Waynesville, Missouri, because enough machinery was working there to throw a scare into the bravest of the wild life. Think of it, 3,600 pieces of equipment working; enough to have a piece of machinery every mile between New York and San Francisco. Floodlighting the Ozark hills at night are 300 light towers; enough to place a good light for a beacon each mile between St. Louis and Chicago. Over 350,000 pounds of dynamite were exploded in 2 months, and buildings are going up at unprecedented rate in this onetime peaceful and quiet Ozark mountain side.

A sewage disposal system for a city of 75,000; water plant facilities to force most of the Big Piney River up into the storage reservoirs of the big training center. Those are a few of the highlights of the job that was completed in record time in spite of discouraging obstacles; a job that has made

• Left: A sewer pipe laying crew closely follows this Bucyrus-Erie 10-B dragshovel as it cuts pipe line trench for the camp's sewage system. Below: Part of the barracks that will house 75,000 men.





• Above: A view of the camp's equipment yard gives some idea of the variety and number of the machines that worked for Uncle Sam on this job. Right: A Euclid wagon takes aboard a load of dirt from the dipper of a Lorain shovel during grading operations.

at Fort Leonard Wood

• Below: The terrain at Ft. Leonard Wood varied from lime-stone rock which kept these wagon drills and compressors busy to mostly mud (right) of the kind that these two Allis-Chalmers tractors are wallowing through to rescue a mud-bound lumber truck.

• Left: Carpenters set up forms for the foundation of a barracks building, while the ¾-yard Marion in the background excavates for another structure. Above: Hard and frozen ground was taken care of by units similar to this Caterpillar-powered LaPlant-Choate ripper so that scrapers could load efficiently.

the country; some of it in one camp and some in another. Completion of the Fort Leonard Wood camp will make possible the centralization of the entire 6th Division in this one location.

The camp will also provide a berth for field artillery units of our national guard. Situated as it is in the rolling foothills of the Ozarks, it will also provide a wonderful location for an extra engineer training center. In that capacity it will assist the engineer school at Fort Belvoir, Virginia, in teaching new officers of the engineer corps the finer points of engineering theory.

When the middle west was selected as the site for a sort of super training station, it was proposed at first to build the camp in Iowa. Plans were formulated by the construction department of the Quartermaster Corps, and negotiations begun with several contractors for the rapid construction of the camp on a cost-plus-a-fixed-fee basis. Because the chief of engineers questioned the water supply at the Iowa location, the camp site was shifted to Missouri, and a tract of land about 3½ miles long by 2 miles wide was reserved in Missouri's scenic Mark Twain National Forest for the camp site.

It is situated about 30 miles southwest of Rolla, Missouri, in the rolling hills and the rocky bluffs of the Ozark Mountains. The geology of the country is typical of the geology of all of central Missouri. Sedimentary formations of limestone with some chert, flint and quartz form the bulk of the hills. The upper limestone strata have disintegrated into a form of shale, or hardpan. Near the many streams of the state alluvium deposits in the form of round, reddish yellow gravel, showing much travel, are found in blankets ranging up to 20 feet in thickness. Topping that off is a general layer of ten feet of red clay with a foot or so of topsoil colored by vegetable matter.

In Fort Leonard Wood the clay blanket was at least six or seven feet thick, shot through under-

neath by the hardpan mixture. Before the buildings of the camp could be built it was necessary to grade the clay from some of the hilltops, dig sewerage and water pipe trenches through the hardpan, and make fills in some of the low spots where ravines traversed the job.

After careful deliberation, the constructing quartermaster awarded a cost-plus-a-fixed-fee contract to W. A. Klinger, Arthur H. Neumann and Brothers, the Western Contracting Company, and the C. F. Lytle Company. For purposes of brevity, the three Iowa contractors named themselves the KNWL contractors and set themselves up to run the job out on schedule.

Work began in earnest in January of 1941. Facetiously, and as if to thwart the movement of men and machinery, rain settled in to drench the Ozark clay with downpour after downpour. Before long the hills were a sea of mud. Travelling anywhere by automobile became an impossibility. The wiser ones put saddles on plain old Missouri mules to get where they wanted to go, and even that wasn't sure for everyone knows how a mule will shy away from a stream or mudhole.

The job for the contractors was all cut out for them. There were 1,537 permanent buildings; big ones, to be built with 250 temporary ones after the excavation was at least partly finished. Fifty-six miles of roads and streets had to be constructed, for there was not one mile of road on the campsite. Twenty-seven miles of railroad, involving 1,500,000 cubic yards of really hard excavation had to be built. A water filtration plant, capable of filtering 9,000,000 gallons of Big Piney water per day, had to be set up. So did a laundry plant, covering better than a whole acre of floor space. About 34 miles of electrical transmission line had to be built to carry the power into the camp.

Let's be honest with ourselves and take a sensible look at the job. Here were four big contractors. They were bringing equipment in as fast as they could rent it or buy it, into a place so muddy that the tractors were miring down. All of this work was staring the boys in the face. That wasn't all. There was a time limit: May 25th, 1941. It was January then. It was raining and sleeting. In five months they had to get the job done. Nobody in that part of the country had ever seen a job that had run out on schedule before. So it's perfectly natural that there were doubts, and plenty of them, that the project would resolve itself into a bottleneck for the midwest army training program. Some of these doubts were expressed orally, and editorially.

It is necessary to think of the job in big terms. It was huge; $33,000,000 worth of it in five months. In that five months the job saw 3,600 pieces of equipment all working, it saw coordination and big scale operation, it saw a weekly payroll for one week of $1,342,418. The job drew praise, and it drew criticism. Through those five months the work went steadily forward. To those who praised the answer was, "We hope to do even better." Those who criticized were told, "Gentlemen, after all we're doing more work than merely digging a basement, you know."

Variety of Equipment Used

The excavation was handled by every brand and every conceivable piece of digging and hauling equipment. Bucyrus-Erie, for instance, was represented by a 44-B shovel, a 20-B crane, a 20-B dragline, a 19-B dragline, three 10-B trench excavators, and an older shovel. Ten International TD-18 tractors on the job carried Bucyrus-Erie built bullgraders and power winches. Allis-Chalmers had tractors and 6-yard Speedaces on the job. Lorain, Northwest, Koehring, Euclid, Hug, Linn, Link Belt, P&H, Caterpillar, LeTourneau, Marion and a host of others all played their own important part in this gigantic joint venture that threatened through those dismal days in January not to be finished on time. It must have been a magnificent thing to watch; certainly it is a tribute to Americanism to see foremen and oper-

• A city of some 75,000 called for the complete sewage disposal plant shown here during early construction operations.

ators who for years have rivalled each other in their deeds of quality and prowess, all joining to get this camp ready. The fort will always be a monument to competitive machines united in their task to get behind the wheel and push together.

The excavation was so located that many of the more prominent knolls around the camp site had to be leveled off. A fleet of tractors and scrapers was brought in to do the biggest part of this work. Hampered by the mud, about all the machines could do was to churn around with the aid of pusher cats until they had worked down to the hardpan underneath the clay layer. This harder material was then used to make haul roads to the waste areas. It was only by building many miles of hard roads for the machines to work from that the 3,000,000 cubic yards of excavation was handled.

Very often it was necessary to use a tractor pulling, and one pushing behind a tractor-scraper combination to get any sort of load at all. During the worst part of the winter when the mud got "durned near belly deep on a tall Indian" whole pools of slush and mud were moved out and distributed with other more solid digging by the bullgraders. These machines pushed the ooze out until some sort of a stable footing could be maintained for the other less mobile earth movers. In the dead of winter when the ground was

(Continued on page 430)

• This trestle was built to carry the camp's access railroad over the Big Piney River.

• Tractors were always kept busy during camp construction operations. In the foreground a Caterpillar assists in laying a pipe line, while in the background three more are engaged in grading operations.

• Foundation excavation for Ft. Leonard Wood's water works filtration plant called for the services of a Baker 'dozer mounted on an Allis - Chalmers tractor and a Lima shovel.

J. A. Terteling & Sons bring big draglines to the South in handling major excavating contracts at Santee-Cooper, the South Carolina Public Service Authority's great power and navigation project

Photographs Courtesy of South Carolina Public Service Authority

WITH THE EXCEPTION of such "naturals" as Niagara Falls, hydro-electric projects have been pretty largely confined to mountainous regions where streams build up considerable heads by dropping sharply in a short distance.

The unique feature of Santee-Cooper is its location in a coastal plain within 50 miles of Charleston—possible only because two valleys having different elevations are separated only by a comparatively narrow ridge. By cutting a canal through this ridge and damming the lower valley, it will be possible to build up a 75-foot head at the power house.

In addition to power production, this $40,795,000 project will provide a convenient and economical water route from Charleston to Columbia. This part of the project dates back to 1771 when the Province of South Carolina employed Henry Mouzon, Jr., to map a canal connecting the Santee and Cooper rivers. Work on such a canal was begun in 1793 and completed in 1800, at a cost of $750,000. The canal was 22 miles long, had a surface width of 35 feet and a 4-foot minimum depth. There were 10 locks, of brick or stone, solidly built, as is evidenced by an accompanying photograph. Major features of Santee-Cooper are:

- 2 dams
- 2 reservoirs, which will provide a great all-year recreational area with boating, hunting and fishing.
- 26 miles of earth dike
- 7½-mile canal connecting the reservoirs
- Power house and lock
- 4½-mile tail race canal connecting the power house and the Cooper river.

Power Capacity Project

The power house is a reinforced concrete and glass brick structure 380 feet long. Initial installed capacity is planned for 173,300 hp, with an eventual total of 213,300 hp. Annual generating capacity during a year of average stream flow will be 450,000 kilowatt hours of primary, and 250,000 kilowatt hours of secondary power.

The South Carolina Public Service Authority is working toward "an integrated industrial and agricultural economy to be brought about by the transmission and distribution of Santee-Cooper low-priced power."

Next to the power house, and with one of its sides part of the same concrete structure is the navigation lock. The lock chamber is 180 feet long and 60 feet wide. Miter gates will speed transfer to boats from lake to canal. A 75-foot range makes this one of the highest single-lift locks in the United States.

Pinopolis Dam, sharing the southern end of Pinopolis Reservoir with the power house and lock, will have a finished length of nearly two miles, and is of compacted earth construction. Twenty-six miles of earth dike, with a crest elevation of 88 feet above mean sea level complete the "man-made" part of Pinopolis Reservoir, which will have an area of about 95 square miles and a maximum depth of 65 feet.

The Santee Reservoir will have an area of about 155 square miles and a maximum depth of 35 feet. It will be formed by backing up the Santee River behind Santee Dam. The latter will be about 8 miles long, the southern portion of which is of compacted earth construction with the balance of hydraulic pumped fill except for a 3400-foot concrete overflow-type spillway.

Connecting link between the Santee and Pinopolis reservoirs is

• An early job of J. A. Terteling & Sons' 5-W dragline was shallow excavation at one end of the canal connecting the Santee and Pinopolis reservoirs. Bulk of canal excavation is being handled with two 9-W's.

Digging Up Power in South Carolina

a 7½-mile canal, principal item in the J. A. Terteling & Sons contract and principal digging job on the entire project. With a 200 foot bottom width and 2 to 1 bank slopes, this canal requires an average cut of 30 feet, maximum cut of 40 feet. Banks are divided into two approximately equal sections by a 10 foot berm, and at the top, a 50 foot berm stretches from canal to spoil piles.

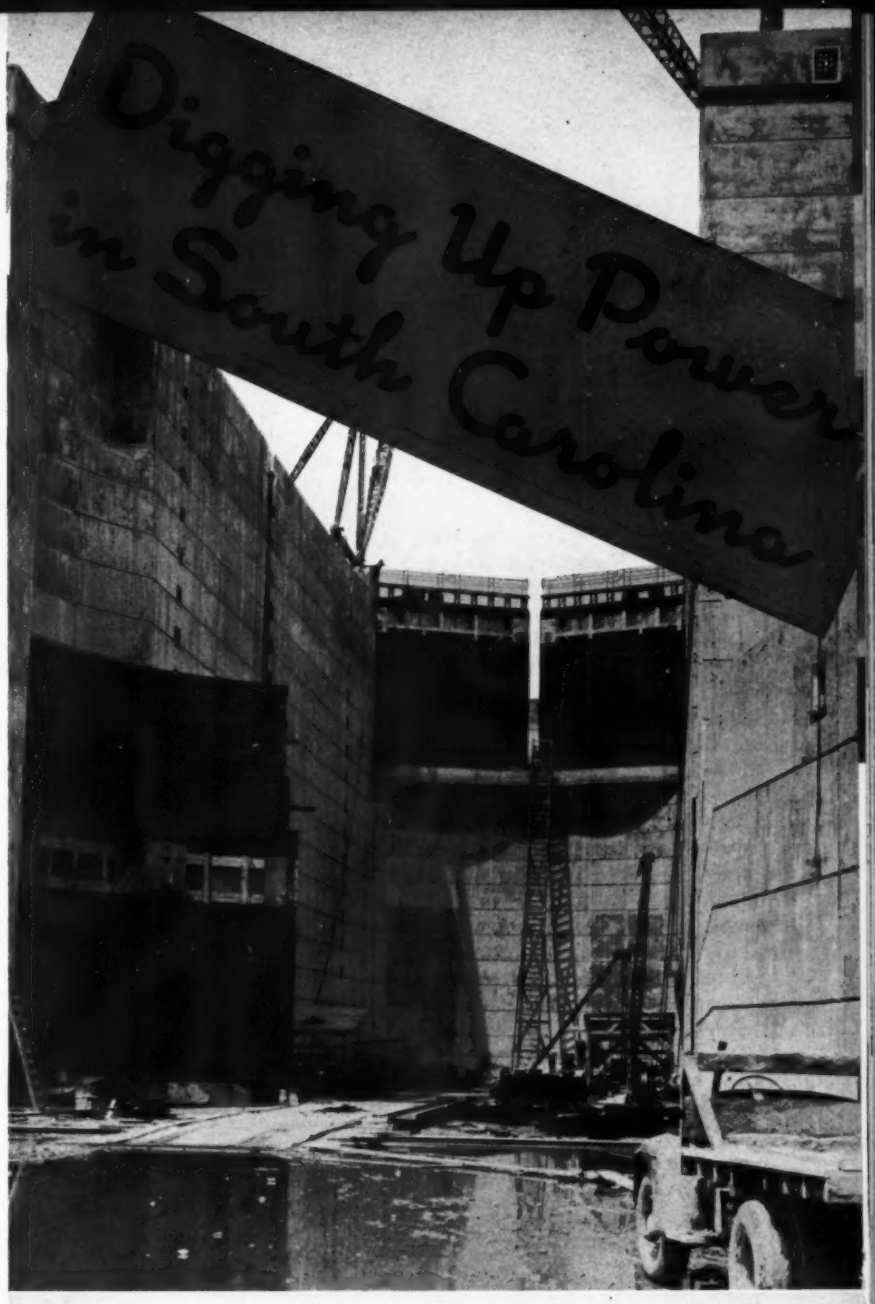
Estimates show a total of 6,550,000 yards of sand, clay and dirt to be excavated in the canal construction. The estimated rock total of 400,000 yards will be considerably exceeded, and the excess rock has required a change in the operating plan for the excavation.

Originally, it was planned to excavate the canal to finished section starting at the Santee and working directly to Pinopolis reservoir, shooting the rock just ahead of the excavation. However, discovery that the rock lay in irregular layers, with varying strips of sand and dirt between, made it necessary to dig one layer of material at a time, working up and down the length of the canal and "peeling" one strip of material each trip.

Terteling Starts Operations

J. A. Terteling and Sons were given work order for their section of the project on March 10, 1940, and moved in on the job 15 days later. The first work necesary was clearing and building access roads, and clearing right of way for the canal and dike sections.

Clearing work, covering about 1900 acres, was subcontracted to Robert Lee, Inc. The Terteling organization used two Caterpillar tractors mounting bulldozers to build the necessary roads, and the excavating was started on May 5. The South Carolina Public Service Authority has urgently requested that the canal be finished by August 15, 1941. That's a schedule that means averaging better than



• **Above: The 180x60-foot chamber of Santee-Cooper's navigation lock is equipped with miter gates that will speed the transfer of boats from reservoir to river. Below: Two Bucyrus-Monighan 5-W's excavate the tail canal that connects the navigation lock with Cooper River.**

500,000 yards a month—no easy job under the best conditions, and a really tough one with the digging as it is. However, unless Ole Man Weather or a very unkind fate make it impossible to maintain the present rate of progress, the Authority is more than likely to have their canal ready when they want it.

Major excavating units on the Terteling work are three Bucyrus-Monighan walking draglines, two 9-W's and a 5-W and a 620 Page. At present the two 9-W's are working on the canal, and the 5-W and 620 Page are starting the dike job—of which, more later. Two of these machines, the 5-W and one of the "big babies," were floated to the job, up the Santee River, on a single barge—the other 9-W made a cross-country trip in 19 railroad cars from site of its previous job in Gothenburg, Neb.

In the early stages of the work, all three draglines were used on the canal. The 5-W, swinging a 4-yard Bucyrus-Erie Red Arch bucket, or a 6-yard light weight Hendrix bucket, started on the upper end, where the going was so swampy that special log mats were required in spite of the extremely low bearing pressure of the machine. The cut at this end was the shallowest on the canal and the longer range of the 9-W wasn't essential.

As this is written, the two larger rigs are working, one on each bank, at about the center of the canal. One of the 9-W's uses a 160 foot boom, the other a 175 footer. Three buckets, a 15-yard Esco, a 9-yard Red Arch and a 13-yard Hendrix, are alternated between the two draglines as the type of material to be dug requires. The heavy-duty Red Arch is used, usually by the longer boom machine, in the rock. The Hendrix buckets for both 9-W and 5-W are specially built for wet digging, having a large number of holes in bottom, sides and back. These not only let the water run out quickly and consequently permit a sizable pay load, but they give an overall lightness with resultant large permissable size.

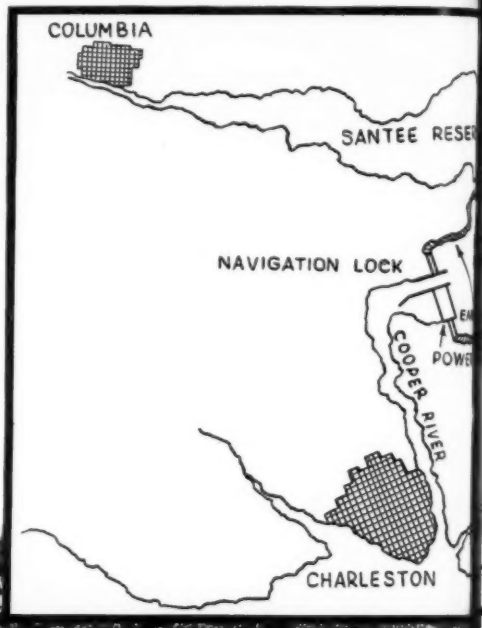
All draglines work three shifts (two 8-hour and one 7-hour) per day, seven days a week, with a crew of four men per shift per dragline. Bethlehem Lang lay cable is standard on the machines. The draglines burn Standard Oil Co. of New Jersey diesel fuel.

Blasting Operations

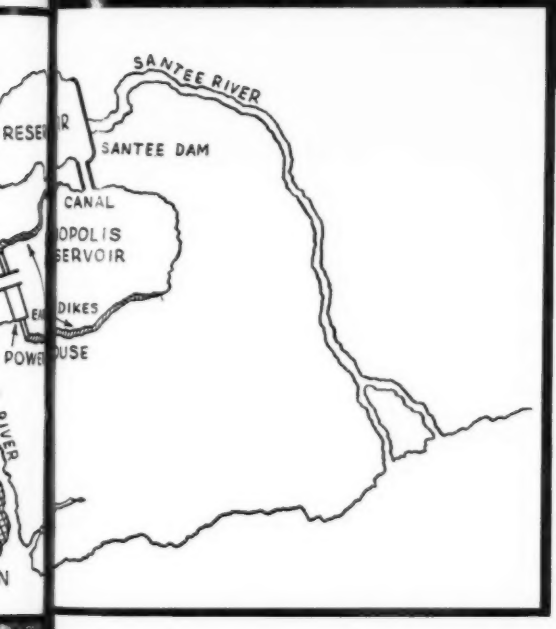
Ahead of the 9-W's a total of about 46 men, split into four crews, work on blasting. Five compressors, a Sullivan, 3 Gardner-Denvers, and a special rig with a Caterpillar engine coupled to a Gardner-Denver compressor, furnish power for drilling. The first four units have 315 f.p.m. capacity each, the fifth is a 365. Four wagon drills, an Ingersoll-Rand and 3 Gardner-Denver's, take care of the "deep" drilling required. Conditions vary with differing rock formations, of course, but the average depth of hole put down by these rigs is 20 feet. Hole diameter is 2½ inches.

Wagon drill holes are shot in groups of 100, spaced on various centers dependent on depth of cut. Du Pont explosives are fired by portable power plant.

Shallow and secondary drilling is handled with 21 jackhammers, 1 Sullivan, 15 Gardner-Denver S55's and 5 Gardner-Denver S-73's. Early in the work, drilling



• Retaining dikes around a spoil area for dredges to pump into are thrown up by Four Merritt Company's Bucyrus-Erie 33-B dragline.



• This rough sketch of the Santee-Cooper project shows the position of the reservoirs, canal, and navigation lock.

was handled on a multi-shift basis, but this was changed to one 8-hour shift 5 days a week.

The second major feature of the Terteling contract calls for the construction of about 24 of the 26 miles of dikes which will keep the the water within the planned boundaries of Pinopolis Reservoir. This work will require 700,000 yards of stripping, 1,960,000 yards of loose fill, and 750,000 yards of compacted fill.

The Bucyrus-Monighan 5-W and 620 Page will handle the stripping, the 5-W having started on this work early in January. Top soil and vegetation are taken off so the dike will have a firm footing. Stumps left standing from the clearing were pushed out by a bulldozer mounted on a Caterpillar D8, working just ahead of the 5-W.

The dike in the contract is to be built to Elevation 88. Fills over 17 feet deep are compacted, others cast up loose. The sand and clay is highly impervious and makes an excellent material for the purpose. The contract calls for the seeding, in grass, of the outside of the dike. A separate contract covers riprapping the inner face. Large stone dug up by the 9-W's on the canal is piled to be used for this.

The West Dike under the Terteling contract is divided into two sections. One of these, which must be compacted, has been subbed to Kile Killman. This section is being built up by Caterpillar-drawn 12-yard LeTourneau scrapers, and compacted by sheepsfoot rollers. The fill is laid in 6-inch layers and compacted at optimum moisture content. With a 10-foot top width, the dike is built with 2 to 1 slopes. The second section of West Dike is uncompacted and will be thrown up by the draglines.

• Air view of the 7½-mile canal connecting the Santee and Pinopolis reservoirs, showing one of the two Terteling Bucyrus - Monighan 9-W's at work.

As the canal nears completion, one of the 9-W's will be shifted to help the Bucyrus-Monighan 5-W and 620 Page in the dike construction. Also available to fill in, where and if required, is a Bucyrus-Erie 52-B powered with an Atlas diesel engine. This rig was used as a crane in setting up the Bucyrus-Monighans, and then, as a dragline, dug the drainage ditches required in connection with the canal. Similar ditches, behind the dike section, were handled under subcontract by Robert Lee, Inc., using two ¾-yard draglines, a Bucyrus-Erie 20-B, a Northwest, and a 1¾-yard Northwest.

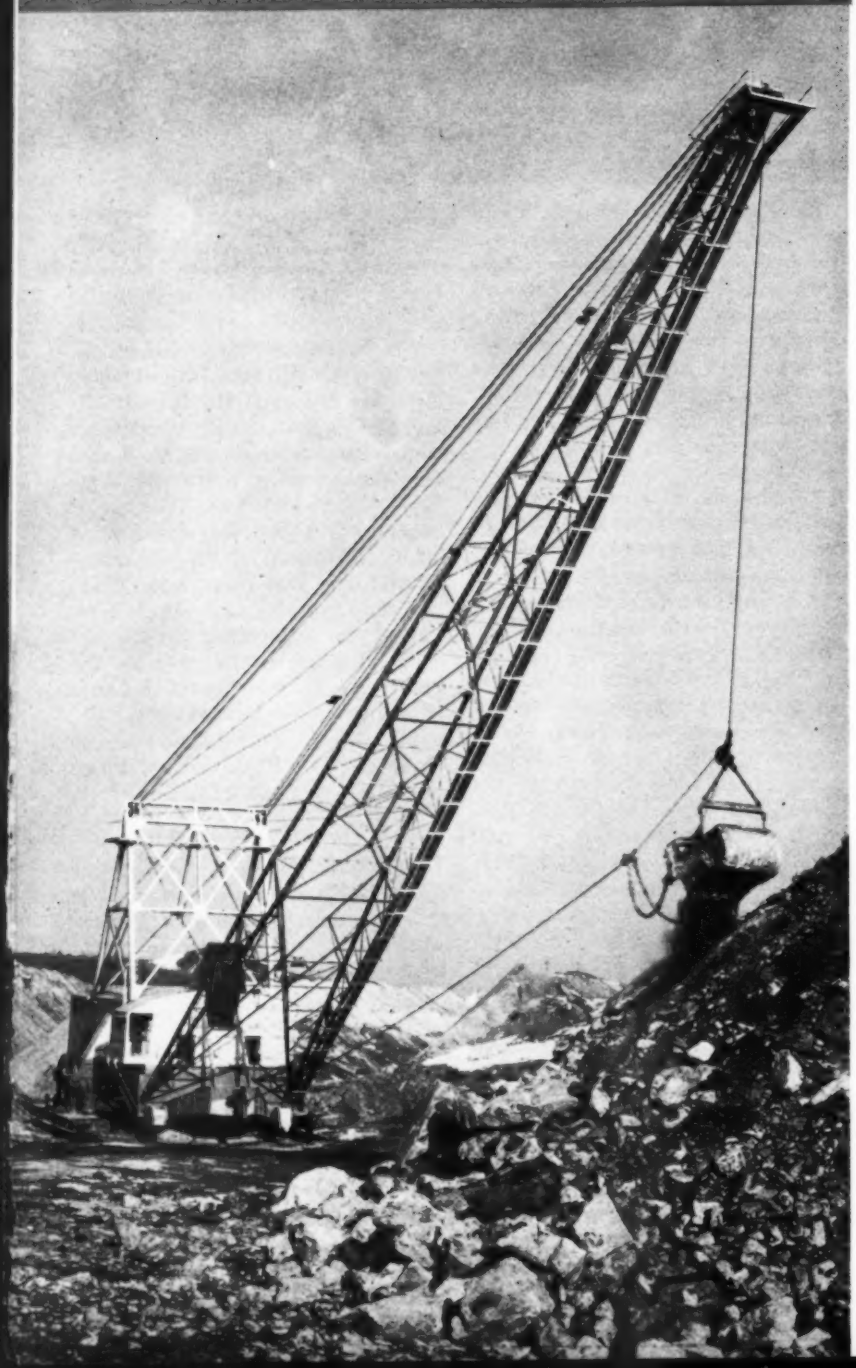
"Canal Specialists"

J. A. Terteling and Sons—home office, Boise, Idaho—might well be called canal specialists. Canal work they have handled in recent years includes the Casper-Alcova project in Wyoming, the Owyhee project in Oregon, the Yakima canal and tunnel work on the Rosa project in Washington and the Black Canyon project in Idaho, the Platte Valley project in Nebraska, and 4 big jobs for the Central Neb-

(Continued on page 424)

TOUGH DIGGING AT STOCKTON

Central Pennsylvania Quarry, Stripping and Construction Company strips another area of Pennsylvania anthracite near Hazleton with a lineup of modern equipment



CONSTANTLY PERFECTING their operating procedure by the use of modern equipment, Pennsylvania anthracite stripping contractors have come a long way in their highly specialized excavating job of extracting this important mineral from the treasure chest of America's resources.

Anthracite capital of America, the Pennsylvania field lies in the northeastern part of the state and has four main subdivisions, known respectively as the northern, eastern middle, southern, and western middle with a total area of 484 square miles. Intense folding caused by one time movements of the earth's crust has placed some of the coal in synclinal troughs, where it has been preserved from erosion which has removed the coal from the intervening anticlines. Because of this the anthracite is found in a number of more or less separated narrow basins. It is established that the original quantity of coal was about 20,000,000,000 tons, of which 4,400,000,000 have been removed to date, with about 9,000,000,000 of the remainder recoverable.

Although underground mines have accounted for the greatest portion of anthracite produced, the efforts of the stripping contractors have resulted in large quantities of open cut mined anthracite wherever the black diamonds are within reaching distance.

Introducing the Company

This "reaching distance" is being continually lengthened by the modern methods of many Pennsylvania stripping organizations. One of the leading contractors in this group is the Central Pennsylvania Quarry, Stripping and Construction Company of Hazleton, Pennsylvania. That's a somewhat lengthy company name, but it means just what it says, for this organization has been serving Pennsylvania in these capaci-

• This Bucyrus-Monighan equipped with an 8-yard Red Arch bucket is the newest addition to Central Penn's stripping equipment and will account for a large share of the Stockton overburden.

• Tough rock at the Stockton stripping calls for tough drilling equipment. Here is one of the company's Bucyrus-Erie 42-T's putting down 9-inch blast holes.

ties for many years. Organized in February, 1903, the company has handled many large anthracite coal stripping contracts for such Pennsylvania coal companies as the Lehigh Valley Coal Co., Wilkes-Barre; Lehigh Navigation Coal Co.; Lansford; Hudson Coal Co., Scranton; Jeddo-Highland Coal Co.; Jeddo; Hazle Brook Coal Co., Jeddo; Coxe Brothers & Co., Hazleton; Philadelphia & Reading Coal & Iron Co., Pottsville; and Cranberry Creek Coal Co., Hazleton.

Central Pennsylvania Quarry, Stripping and Construction Company has long been demonstrating the meaning of that "Construction" part of the company title in the many road construction jobs it has performed for the Commonwealth of Pennsylvania as well as the State of New Jersey. One of its most important jobs was the part it played in the construction of Pennsylvania's famed 161-mile turnpike, one of the world's outstanding superhighways. The company completed a $1,700,000 contract on this project, moving about 2,000,000 yards of material to build the finished grade of 7.27 miles of turnpike.

The man who makes the wheels go 'round in the Central Penn organization is W. C. M. Butler, president of the company. As friendly as he is capable, Mr. Butler has been directing the operations of the company for over 20 years. C. T. Butler as assistant general manager, W. C. M. Butler, Jr. as vice president, and La-Fayette Butler as secretary and treasurer, assist President Butler in the executive control of the Central Penn organization.

Fred Meikrantz, superintendent of stripping; John B. Bruns, superintendent of road construction; J. W. Rich, stripping engineer; J. P. Smith road construction engineer; and Walter Evans, master mechanic, are immediately responsible for the operation of the company's field forces.

Central Penn's largest anthracite stripping contract at this writing is the Stockton stripping near Hazleton. Here the company is handling an estimated 5,000,000 yards of overburden to mine coal for the Jeddo-Highland Coal Company. Men and machines at the Stockton stripping are under the supervision of Superintendent Meikrantz assisted by Fred Gabel, general foreman.

The stripping area lies over the Primrose and Mammoth veins and like the majority of the Pennsylvania anthracite field, the coal deposits are covered by varying beds of shale, clay, sandstsone and conglomerate.

Drilling the Overburden

Drilling is handled by two Bucyrus-Erie 42-T wire line and two Loomis Clipper manila line

• Heavy rock work at Stockton is handled by this Bucyrus-Erie 100-B electric shown dumping the contents of its 3½-yard dipper into a 10-yard Euclid truck.

blast hole drills. Operating platforms of the 42-T's are equipped with built-in power-driven tool wrenches that enable the operators to make tool changes quickly and with a minimum of effort. Besides cutting the time for tool changing in half, this modern platform improvement is safety-first insurance against broken legs and smashed toes caused by the old methods of handling heavy tools on muddy or rocky terrain.

In this area 9-inch holes spaced on 20-foot centers have been giving the most effective breakage. A typical blast runs about 60 holes drilled from 70 to 90 feet deep and loaded with 70,000 lbs. of powder. A recent shot using this ratio broke up 114,000 yards of rock overburden for the Central Penn shovels. Hercules, Atlas, and American Cyanamid powders are used.

General overburden stripping equipment at Stockton is captained by a recently purchased Bucyrus-Monighan 9-W electrically-powered walking dragline. This dragline is playing an important part in Central Penn's economical development of the Stockton stripping area. Swinging an 8-cubic yard Red Arch bucket from a 200-foot boom this modern machine will eventually move overburden to a maximum depth of 160 feet. An area of 438 square feet for both shoes and 748 square feet for the base enable the 957,000 pound machine to work in the softest kind of going as it advances over the stripping area in 7½ foot steps.

Equipped with Ward-Leonard control, the 9-W is powered by a 450 hp driving motor. A 250 hp hoist motor provides the necessary power for the specially built machinery that is designed to provide fast hoisting speed for deep digging. Twin swing motors of 75 hp each are another modern feature of Central Penn's 9-W that enable it to complete a digging and dumping cycle every 70 seconds. Since the machine had just been put on the job at the time of the writer's visit, no performance figures were available, but the rate at which the 9-W was slinging dirt on the spoil piles promised some good digging records for the future.

The balance of the Stockton stripping excavators consists of a Marion 125 dragline working a 3-yard bucket from a 125-foot boom; a Lima 601 equipped with a 1¼-yard bucket used in light overburden, coal loading and drainage work; a Bucyrus-Erie 100-B with a 3½-yard dipper for handling heavy blasted rock; and a 2-yard Osgood shovel employed in general clean up work. Two

• It's stripping and loading teamwork as a 1¾-yard Bucyrus-Erie 52-B loads coal that has been laid bare by the Marion 125 swinging a 3-yard bucket from the top of the over-burden.

Bucyrus-Erie 52-B 1¾-yard draglines load out the uncovered coal to 10-yard Euclid trucks that haul it about 2500 feet to the Jeddo-Highland tipple.

Voluntary Agreement Limits Production

At the time of the writer's visit the Stockton drilling and excavating equipment was working on a three 7-hour shift per day basis with a total of 104 men employed. Since production on all Pennsylvania strippings is regulated by a voluntary agreement among leading Pennsylvania anthracite operators the number of days worked per week on coal loading operations at the Stockton stripping is

dependent on the company's allotted production quota.

Started in January, 1940, this "Anthracite Emergency Program" is a voluntary stabilization agreement by anthracite producers, United Mine workers, and state administration. Designed to provide job security for mine workers, the regulatory agreement assigns a certain production figure to each company based on the first four months of that company's 1939 percentage of production in relation to the production of the other companies at the same period. As this voluntary agreement regulates the volume of coal produced to actual needs, stripping operations are naturally planned accordingly.

So far no mention has been made of the final disposal of overburden at the Stockton stripping. Currently this overburden is being saved from the usual inglorious end in a spoil dump to worthwhile use as protection dike fill in the relocation of Hazle Creek which runs through the property. This creek which had formerly been diverted from its bed to accommodate coal stripping operations is now being changed back to its original course. Since this course runs between the Lehigh Valley Railroad right-of-way and a low area in the strippings, a ditch 20 feet wide and 8 feet deep is being excavated by the 1¾-yard Lima dragline.

Rock and earth overburden rolling in from the stripping machines about one mile away on 7 Euclid trucks of 10 yard capacity, and 5 Sterlings and 3 Walters carrying 8 yards per trip is used as dike fill on the low stripping area side of the ditch. A LaPlant-Choate 'dozer powered by a Caterpillar D-7 and an International TD-40 carrying a Euclid blade are kept busy grading the floor and sides of the new stream bed and leveling the dumped truck loads. Since a large part of the ditch will closely parallel the Lehigh Valley railroad tracks and the fact that the stripping area it bounds will be on a much lower grade, care is being taken to make the excavation watertight. Sides of the ditch are lined with overburden that is predominately clay. Over this a layer of blasted rock is spread in riprap fashion to form a flood-proof sidewall. About 3,500 feet of Hazel Creek's bed is being excavated and lined in this manner.

Well, there you have a cross section of the activities at the Central Pennsylvania Quarry, Stripping & Construction Company's Stockton stripping. Multi-

(Continued on page 434)

• A LaPlant-Choate 'dozer mounted on a Caterpillar D-7 levels out a truck load of clay lining along the side of the Hazel Creek relocation.

• Below, top: A Euclid dumps 10 yards of rock riprap along the bank of the Hazel Creek relocation, while in the background the 1¾-yard Lima excavates the new stream bed. Below: Two methods of coal mining meet in this view of the breast of an old underground mine that have been uncovered by open cut operations.

97.6%

CALCIUM CONTENT

Riverview Stone & Material Company aims at future development by skillfully planning today's limestone quarrying operations in its two Missouri plants

IF YOU ARE familiar with St. Louis and its environs, you may know the addition to Shurtleff College at Alton, the addition to Armbruster Chapel at Clayton, the Pilgrim Evangelical Church in St. Louis itself. These, as well as many fine private residences are built from the limestone produced by the Riverview Stone and Material Company.

Plant No. 1 of this company, located at the end of Riverview Drive about 8 miles north of the St. Louis city limits, presents some interesting developments in small quarry technique. The property, comprising a total of 8 acres has been worked for only four years, and only two of those under the present management. Consequently, sound planning for future operations plays an equally important part with the task of getting out the stone required by current orders.

The stone on this property has the highest calcium carbonate equivalent in the section, which makes it good stone for highway work and agricultural use as well as building construction.

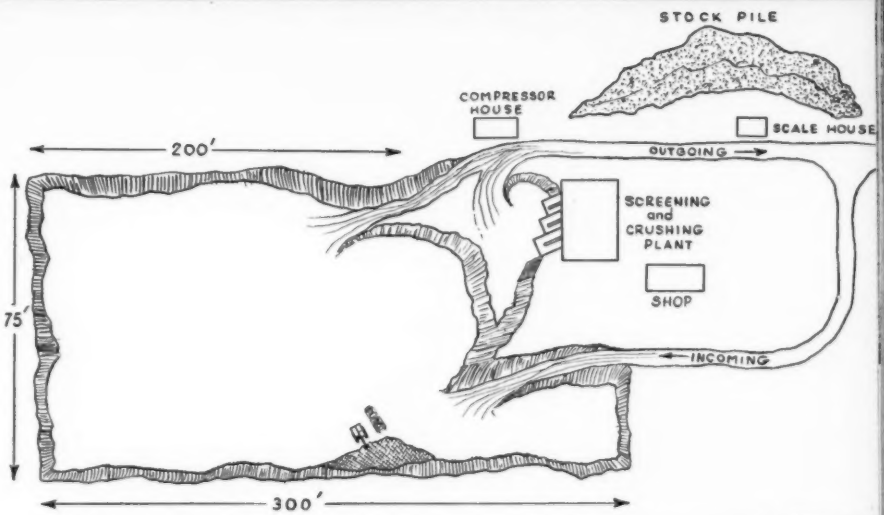
The deposit has been tested to 90 feet below the level of present operations and found to extend to that depth. How much deeper it goes is not known.

A total of 35,000 yards has been stripped from the deposit to date. Overburden has averaged 25 feet in depth and the maximum so far handled was 30 feet. Stripping was done by a Bucyrus-Erie 1020 gas shovel which also handles the stock piles. The general layout of the quarry is shown in the accompanying sketch. A 54-foot face is worked along the 300 foot length, and will be continued until the property line is reached.

A Gardner-Denver 220 cu. ft. compressor furnishes air for the Chicago Pneumatic, Gardner-Denver and Worthington jackhammers which handle drilling. One shot, fairly typical, took 32 holes spread over 150 foot length, and

• Blasted limestone is loaded out to a 6-ton Ford truck by the company's ⅜-yard Bucyrus-Erie. Note jackhammer drilling operations on upper ledge.

• Above: Riverview Stone & Material Company's No. 1 plant overlooks the surrounding country side and the limestone quarry that feeds it. Right: Sketch of the quarry, showing general layout of the operations.



set 12 feet back from the face. Average depth of the holes was 22 feet. Du Pont Extra E dynamite was loaded "top to bottom" with the top five feet of each hole stemmed. No. 6 electric caps were used to set off the shot, which brought down about 3,000 tons of stone.

Loading Operations

When the present management took the quarry over, loading was handled by Dempster- Dumpsters. In March, 1940, the job was turned over to a ⅜-yard Bucyrus-Erie 10-B. This rig loads the blasted limestone to two Ford trucks equipped with 6-ton bodies, which haul it up a ramp to a dumping platform from where steel-covered slides feed it to the crusher. Present capacity of the crushing and screening plant, 250 tons per 8-hour shift, governs the output of the digging and hauling units.

The No. 6 Allis-Chalmers gate crusher has a top size of 3-4-inch stone, but 2-inch is the largest

(Continued on page 434)

• Riverview's crushing and screening plant is housed in this structure. Two trucks in the loading tunnels are taking on a load of the finished product.

EXCAVATING ENGINEER

A Monthly Publication

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Will Defense Road Appropriation Fall Short of Actual Needs?

President Roosevelt in a message to congress on June 2 asked for $125,000,000 for immediate defense highway improvements. The recommendation called for $100,000,000 for military access roads and $25,000,000 to strengthen bridges and widen highways on the strategic military system of 75,000 miles in "key areas."

This request was disappointing to many persons interested in United States' highway system and who have made a careful study of the situation. It contrasts with estimates of the Public Roads Administration, made public February 13, calling for $287,000,000 fore defense roads and drastically increased on May 15 to $808,000,000.

Bills to carry out the president's recommendations are being sponsored by Senator Hayden, of Arizona, and Congressman Cartwright, of Oklahoma.

The early estimate was divided into $150,000,000 for access roads; $25,000,000 for tactical roads; $100,000,000 for the strategic system, and $12,000,000 for future planning of the strategic highway system. The later figures called for $458,000,000 to be spent immediately in strengthening the strategic network and $350,000,000 for construction of access roads.

While President Roosevelt's request for $100,000,000 for access roads would permit construction to start on a sizeable job, it falls far short of immediate requirements cited by the Public Roads Administration in either of its estimates. It is understood that the states will be expected to match federal aid funds for strengthening the strategic system.

The president's message does not contemplate spending anything like the $458,000,000 estimated by the Public Roads Administration as needed for strengthening the entire strategic network of highways. In fact, the president wrote, "It is my belief that no necessity exists for undertaking such an extensive program now."

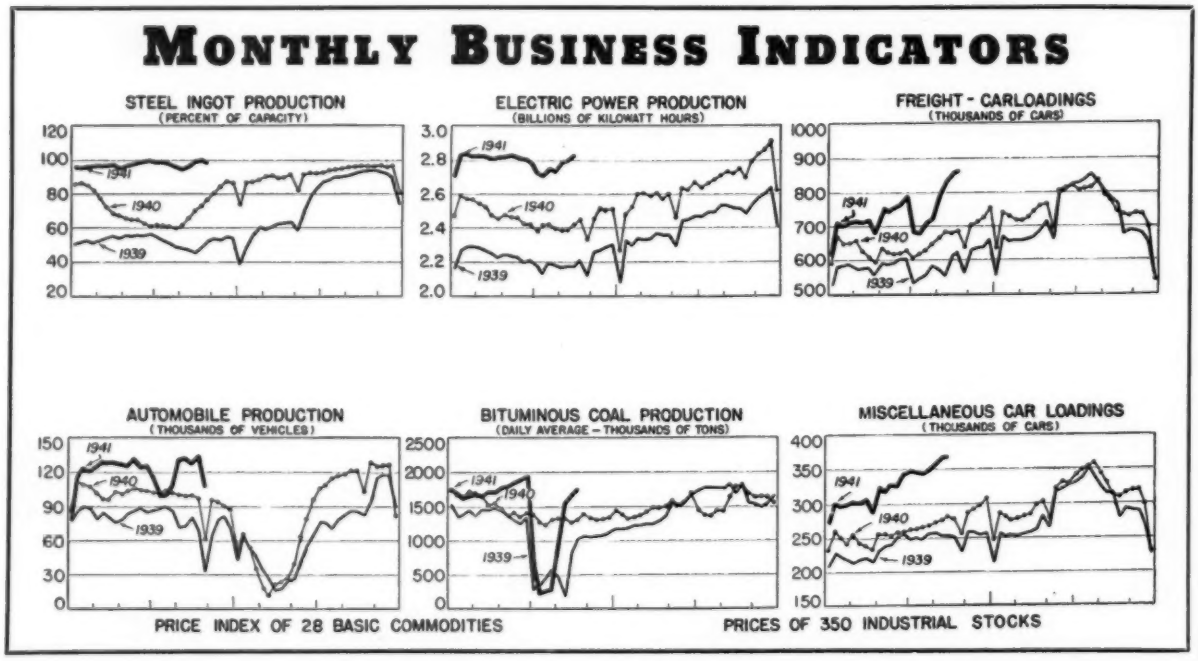
Mr. Roosevelt expressed the "hope" that readjustments in state highway programs would be made to release state funds for meeting part of defense roads requirements and urged that "local participation should be encouraged to the fullest possible extent" in the development of access roads. It is pointed out here that many state highway departments already have made serious efforts to find funds for defense highway needs but without appreciable success. In the meantime, almost impossible traffic conditions are reported to exist in many defense areas over the nation.

The president's reference to defense highway work thus far having been financed in part by the Works Progress Administration, increases the fear in some quarters that additional authority over highway construction and improvement may be vested in this work relief agency.

Contract Volume Continues Gain

Construction contracts amounting to $548,700,000 were reported for the 37 eastern states territory of F. W. Dodge Corporation during the month of May. This contract total, largest monthly figure recorded since June, 1930, represented increases of 35 per cent over the preceding month and of 65 per cent over May, 1940.

Activity, at a record rate for the post-depression era, continues both in public and private owner-



ship construction. Public ownership projects in May accounted for $254,836,000 or 46 per cent of the total. Private ownership construction, however, including many industrial plant projects to be erected for defense production, maintained its dominant position with a dollar volume of $293,864,000, or 54 per cent of the month's total.

One and two family house building continues as a very large factor in the construction program, and contracts represented 28 per cent of the May construction total. This dollar volume made provision for more than thirty thousand new dwelling units. Since the Federal Housing Administration's weekly reported volumes of mortgages selected for appraisal and mortgages accepted for insurance ran well above last year throughout the month of May, continued small-house activity at high levels is indicated.

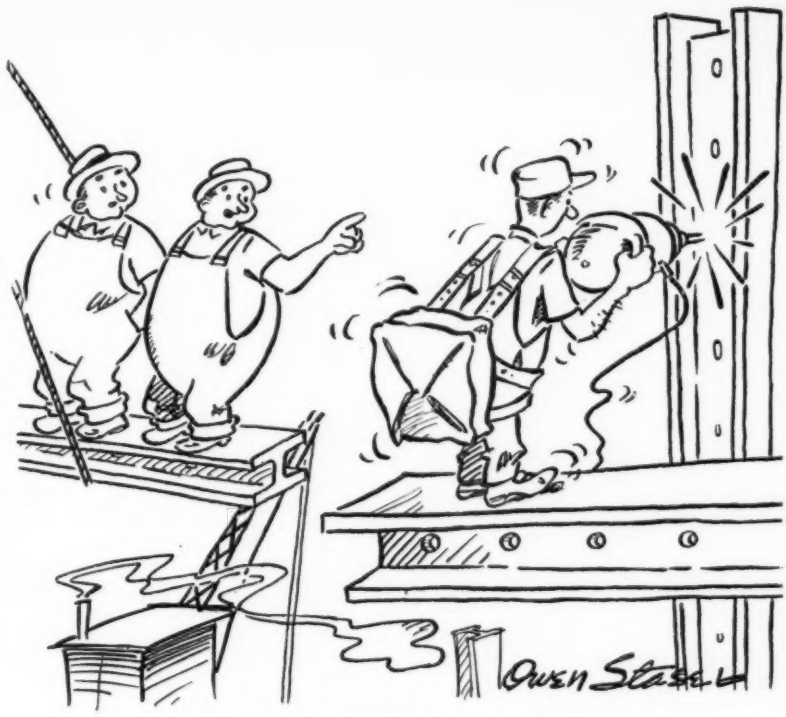
Excessive Federal Gasoline Tax Jeopardizes State Road Programs

A warning against the danger of duplicating federal taxation drying up the most important source of state revenue has been expressed in Washington by Congressman Overton Brooks of Louisiana in a statement regarding the proposal before congress to increase again the federal-gasoline tax.

"The gasoline tax has become the most important single tax of the states. No other tax provides as much revenue to the state treasuries. The fact must be remembered," said Mr. Brooks, "that gasoline-tax revenues originally were intended for highway financing purposes, and highways are primarily the responsibility of the states.

"Automotive taxes originally were imposed by the states, and ever since that time this field of taxation has been recognized as rightfully belonging to the states. Many states have come to rely completely on these highway-user tax revenues for the development of their road systems and the payment of interest and principal on their highway bonds. Excessive taxation of these same subjects would impinge on this revenue source and thereby jeopardize the income expectancy and highway programs of the various states."

Since the adoption of the federal duplicating motor-fuel tax by congress in 1932 a total of 24 states have memorialized congress to withdraw from the field of gasoline taxation, Mr. Brooks pointed out, adding that "only the extreme emergency of the national defense restrained the various states from filing violent protests" against the 50 per cent increase in the federal-gasoline tax rate which was adopted by congress last year.



"Young Sutton doesn't take any chances!"

Russian Road Building

A motor road across the Pamir Mountains, the so-called "roof of the world," has recently been opened to traffic. The road, which is 352 miles long, links the town of Khorog with Stalinabad, the capital of the Soviet Republic of Tajikistan (Central Asia). It was built in 100 days by 22,000 collective farmers of the republic, and crosses the Khabu-Rabad Pass in the Pamirs at an altitude of 3,300 meters (over two miles) above sea level.

The builders had to work where the foot of man had never trod. They had to cross turbulent rivers, inaccessible gorges, hundreds of perilous precipices. They literally had to blast their way through solid rock. A total of more than 176½ million cubic feet of ground had to be shifted, half of which was solid rock.

The building of the road was started on the farmer's own initiative. They felt that the lack of roads was a hindrance to their economic and cultural development. Formerly supplies used to be carried to the districts through which the road runs by camels, horses, and airplanes, and then only in the short summer of three months. Now motor services will be maintained along the new highway throughout the year. The new road opens up prospects for the exploitation of the immense natural resources of the Pamirs.—*Highways and Bridges, London, England*

Japan Plans Super-Highway

Japanese officials are reported to have approved general plans for construction of a new super-highway between Tokyo and Shimoneseki at an estimated cost of 60,000,000 yen, or about $2,000,000.

Wanted: Back Copies

To complete office files, Excavating Engineer would like to buy (or borrow for photostat purposes) back copies of its forerunner "Steam Shovel News" from April, 1907 to July, 1910 inclusive. If you have copies of any or all of these issues, please drop a post card to Excavating Engineer, South Milwaukee, Wisconsin, U. S. A.

Equipment

you ought to KNOW ABOUT

Bottom-dump earth hauler

Manufacturer: The Euclid Road Machinery Company, Cleveland, Ohio.

Claims: Designated as model 5LDT-71W with a struck measure capacity of 21 cubic yards. Has a

heap load capacity at a 2-1 slope of 26.5 cubic yards. Designed and constructed throughout to carry a payload of 60,000 lbs. It has eight speeds forward ranging from 2.1 to 23.3 m. p. h. at governed engine speed with full payload and two reverse speeds. The trailer hopper is of wedge-shaped design and construction. The center of gravity of the loaded unit is moved forward and downward, thus increasing stability and traction. The steep smooth sides and unobstructed full length and width door opening permit quicker dumping. The 5LDT-71W Euclid is equipped with Bendix-Westinghouse air brake power and control equipment. The 26" x 6½" brake shoe assemblies on the drive and trailer axles are of Euclid design and manufacture. Steering and traction brakes are air powered and controlled; opening or closing of the bottom doors is operated by air power mechanism and the exclusive Euclid patented "Wheel Wind," with a control valve on the steering column. The 3-way universal tractor - to - trailer hitch, combined with the large tires, gives this machine mobility and ease of operation.

"Screw-Tite" lugs

Manufacturer: Ideal Commutator Dresser Company, 4104 Park Avenue, Sycamore, Illinois.

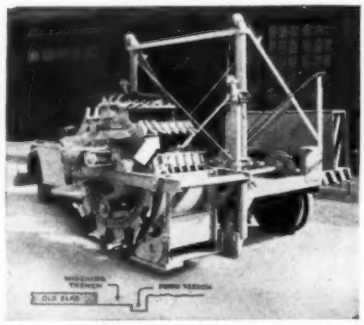
Claims: Set screw type made of seamless, pure electrolytic copper with a heavy brass check-proof shell that reduces heating. Full current carrying capacity is evenly distributed from wire to lug. Eight sizes are available for No. 14 wire to 2,000,000 C. M. cable. Each size is suitable for a wide range of wire. One or two hole types are available with square or round ends. Special sizes and angular types of "Screw-Tite" lugs are also available. The Ideal "Screw-Tite" lug is fully approved by Underwriters' Laboratories, Inc.

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Digging wheel

Manufacturer: The Buckeye Traction Ditcher Company, Findlay, Ohio.

Claims: Designed to excavate trench for forms simultaneously with the excavation of subgrade widening trench. This is accomplished by equipping each bucket on the digging wheel with two rooters which are somewhat larger and longer than other rooters on each bucket. All models of Buckeye Road Wideners can be equipped with rooter teeth for preparing form trench when desired. Buckeye Road Wideners are built in three models: 16-R-2, for digging subgrade widening trench up to 33" wide in one cut; Model 16-R-4, for digging trench up to 48" wide in one cut; Model 16-RD-4 — equipped with rear dump conveyor for carrying excavated material to the trucks following the machine.

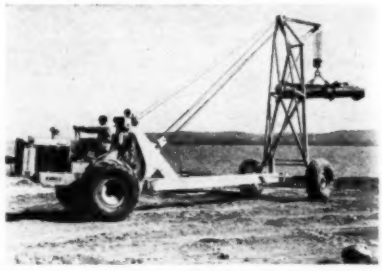


These machines are designed to prepare a mile or more per day of accurate trench adjacent to old road surfaces and are also used for excavations on the inner side of sharp curves where the radius is to be increased.

Mobile crane

Manufacturer: R. G. LeTourneau Inc., Peoria, Illinois.

Claims: Called the Tournacrane. Boom lengths of 20, 30, and



40 feet and a lifting capacity of 10 tons fit it to a wide variety of jobs—unloading flat cars, erecting steel, stacking material in warehouses, placing concrete reinforcement on paving jobs and similar handling of large, awkward and heavy loads. Traveling speeds, up to 14 miles per hour, shorten time between widely separated jobs and extend the work range. Rubber tires and narrow width make fast movement over highways and concrete surfaces possible. Can work in extremely close quarters and over rough terrain. Easy interchangeability with other Tournapull tools such as Carryall scrapers and Tournatrailers. Only one power investment is necessary to handle lifting, hauling and earthmoving jobs. Fifteen or twenty minutes will convert a high-speed, rubber-tired Tournapull from earthmoving with Carryall scraper to a wide-range, lifting tool that will handle many lifting problems.

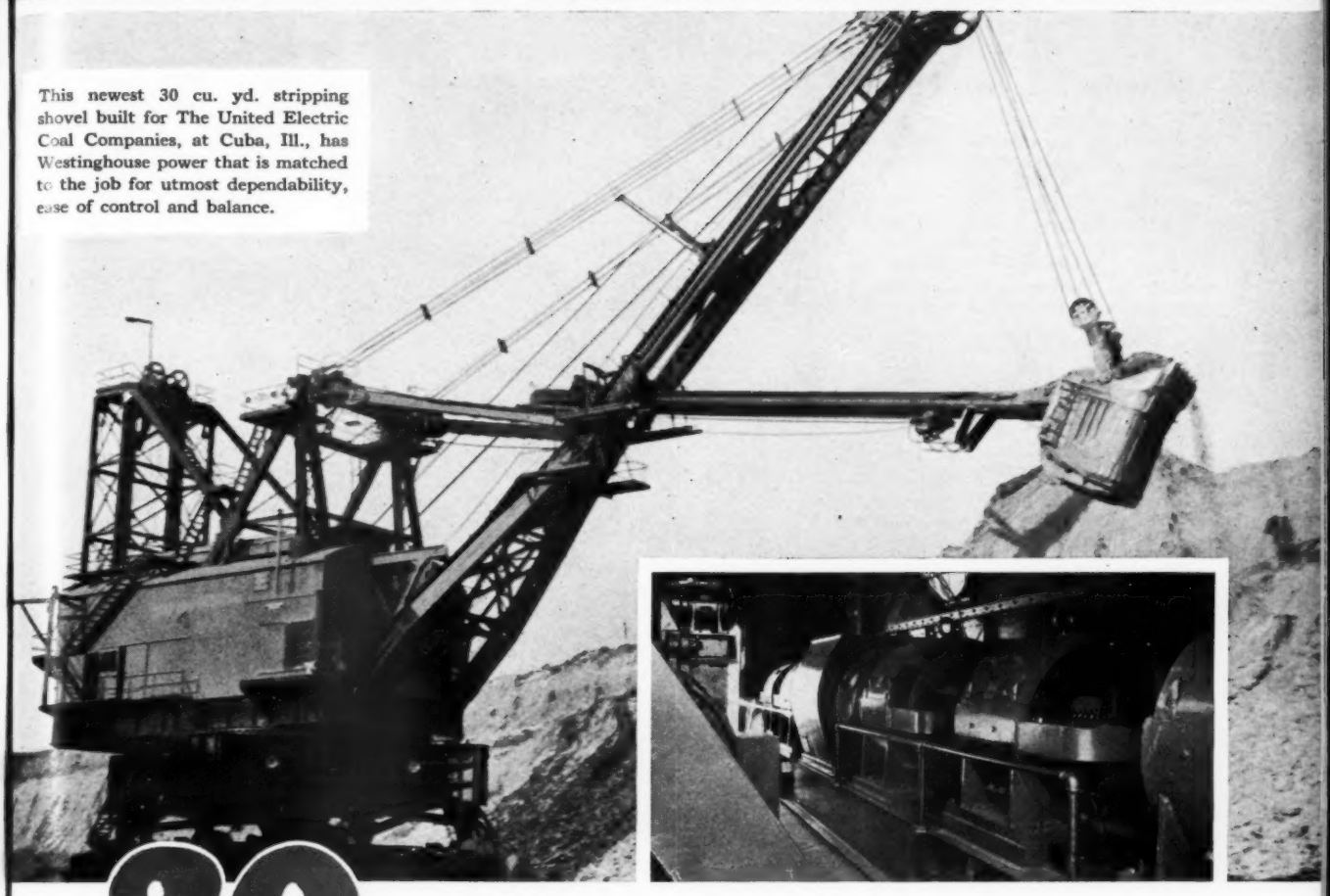
Rubber hose

Manufacturer: The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.

Claims: Developed after months of experiments and exhaustive field tests under the most severe conditions. Other advantages are: lightness in weight, ease of handling, inseparable covers and plies, uniform diameters, and less elongation and expansion. Manufactured in 50-foot lengths on accurate steel mandrels in several types that cover a wide variety of service.

WESTINGHOUSE DEVELOPMENTS SPEED PRODUCTION

This newest 30 cu. yd. stripping shovel built for The United Electric Coal Companies, at Cuba, Ill., has Westinghouse power that is matched to the job for utmost dependability, ease of control and balance.



30 yards at one bite with power by Westinghouse

FOR MAXIMUM PERFORMANCE AND TROUBLE-FREE SERVICE IN MINING OPERATIONS SPECIFY WESTINGHOUSE:

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CENTRALIZED CONTROLS
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LOCOMOTIVES

The ability of Westinghouse to design and build M. G. set, motors and control as a single unit and match it to the job is the result of more than 50 years combined electrical and mining experience. This experience enables them to build in all of the necessary requirements—compactness, durability, accessibility, ease of control and balance. Thus the dependable power required to hoist and swing big dippers used in stripping operations is actually supplied as a complete "packaged" unit—time-tested and proved for severe mining service.

Westinghouse "packaged" power is available to you on any electric shovel operation. Call your nearest Westinghouse office for details.

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TIME-SAVER FOR THE MINING INDUSTRY

Shots from the FIRING LINE

AGC Holds Executive Session

The Associated General Contractors of America held the spring meeting of its governing and advisory boards at the Greenbrier, White Sulphur Springs, West Virginia, June 10 and 11, 1941.

The principal business at this executive convention closely followed the advance aims released by Managing Director H. E. Foreman who announced:

"The theme of the board meeting will be fitting the construction industry more completely to defense needs, and studying the problems which can be anticipated following the defense effort.

"Three broad categories of problems brought about by the national defense program will form the background for discussions.

"I. National Defense. Size and importance of the entire national defense program have so increased that no business activity of any kind can escape its influence. The possibility of war in the near future intensifies all its problems.

"In defense construction, a large volume remains to be performed, attended by many current problems and some new ones. Much military and naval construction is to be done. Many community facilities must be enlarged. Nearly every defense production facility needs expansion. Whether from federal funds or others, a large volume of work is to be done.

"The primary job in construction is to see that this is done with the utmost in speed, economy and efficiency.

"II. Private Construction. Much private construction must continue. How is the problem to be faced? Already there is talk of curtailing home construction and other types of non-defense construction during the emergency. Priorities and the rationing of materials, particularly metals, will prohibit the use of many materials in construction if not actually hamper it. Government officials are suggesting there may be a time soon when steel production will be adequate for only defense and most urgent non-defense needs. Availability and price of labor will be important. The whole private construction market will depend greatly on what happens in the entire defense program.

"III. After Defense Depression. In spite of the possibility of war, discussion has started on caring for the unemployment to follow the end of the defense program. Public works programs figure most prominently in the talk. The public has come to accept the policy that work shall be provided for the unemployed. The question for construction is, will the employment be in the industry or through direct employment by the government. Industry must share in the planning for the future if it is to do its share in providing for the unemployed.

• Loading and breaking operations present contrasting methods as this Bucyrus-Erie ⅜-yard shovel handles rock at Mahad Dahab mine in Jedda, Hejaz, Arabia. Note the tropical cab arrangement.

"Each of these categories embraces many knotty questions. The questions go beyond those of an individual job. They require the best thinking of the entire construction industry for their solution."

M. W. Watson, of Topeka, Kansas, president of the national association, presided at the board meeting sessions.

Sterner Appointed Defense Road Coordinator

New Jersey Highway Commissioner E. Donald Sterner's acceptance of an appointment from Thomas C. Frame, president of the Association of Highway Officials of the North Atlantic States, to take charge of coordination of all defense road operations from Maine to Virginia was announced June 4 in Trenton.

Sterner announced he would start work immediately on his new duties, which include supervision of the assembling of all information pertaining to strategic military highways and existing and necessary roads to army camps, naval bases, airports and arsenals. This and information respecting vital defense industries will be made available to army, navy and defense production authorities.

William L. Dill was nominated some time ago by Governor Edison as Sterner's successor in the New Jersey highway post, but Sterner has been holding over in office pending action by the state senate on the nomination.

Award N. Y. C. Tunnel Contract

The New York City Tunnel Authority opened bids May 27 on the largest of three major contracts in connection with construction of the $80,000,000 Brooklyn-Battery Tunnel. The lowest bid on the contract was $13,888,000 by the George H. Flinn Corporation of New York. Next lowest bids were $14,345,000 by the S. A. Healey Company of White Plains, New York, and $15,795,000 by the Rosoff Tunnel Corporation of New York.

George H. Flinn Corporation, the successful bidder, was formally awarded the contract and started work during the first week of June. The contract includes all work on the twin tubes of the tunnel from the construction shafts at Hamilton Ave. and Summit St., Brooklyn northward under Buttermilk Channel almost to Governors Island. Remainder of the work will be covered by other contracts.

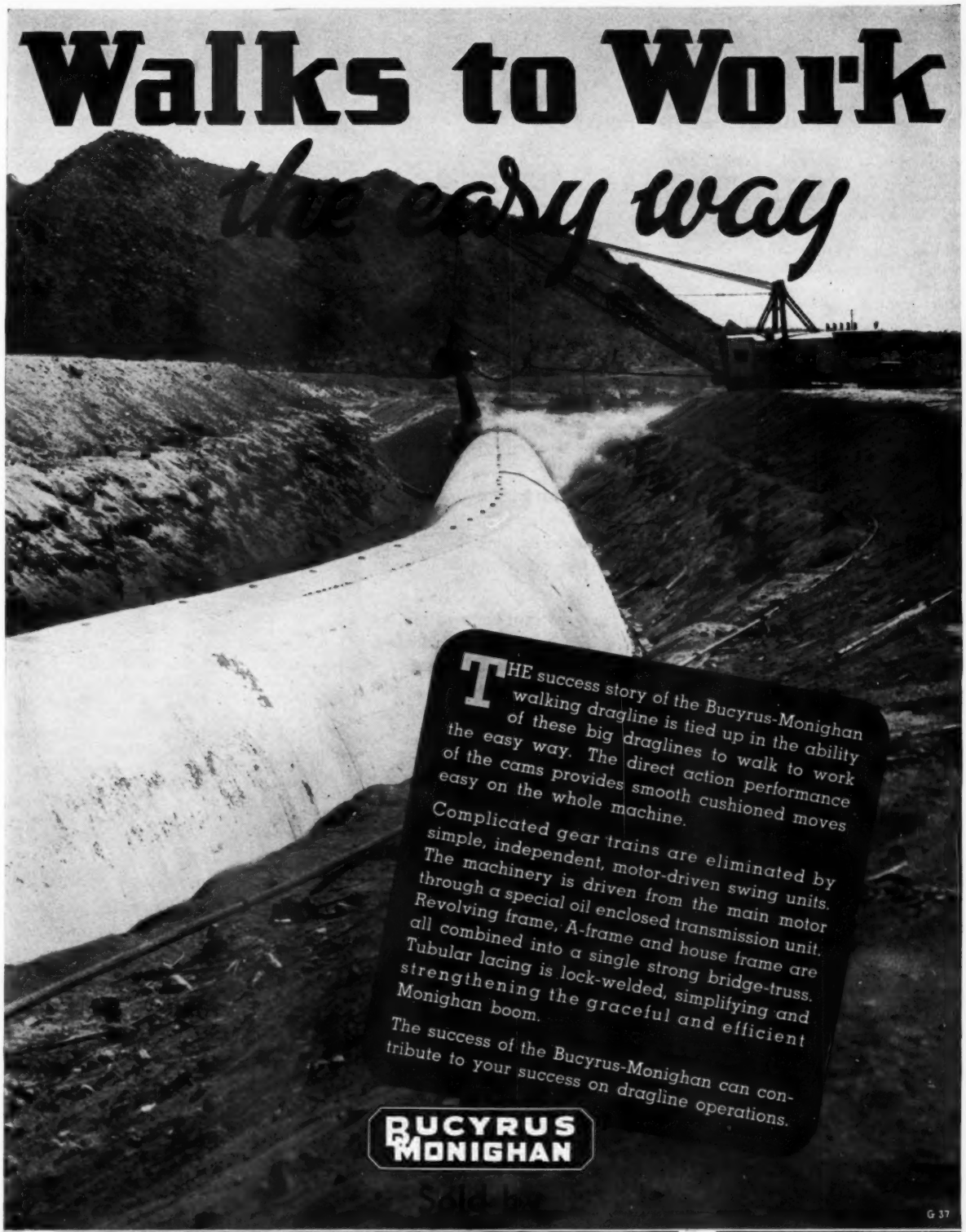
President Urges Construction of St. Lawrence Seaway

Stressing the need to break the Great Lakes bottleneck as well as the importance of constructing further hydroelectric sources, President Roosevelt urged the prompt approval of legislation to authorize construction of the St. Lawrence seaway and power project in a special message to congress on June 5.

A bill authorizing construction of this project was introduced in the house June 2, by Chairman Mansfield (Dem., Tex.) of the rivers and harbors committee. A companion bill may be introduced in the senate, or the upper chamber may wait until the house has completed action. The bill provides no appropriations. These will be made in another bill if the present measure is passed.

Declaring that no comparable power,

Walks to Work *the easy way*



THE success story of the Bucyrus-Monighan walking dragline is tied up in the ability of these big draglines to walk to work the easy way. The direct action performance of the cams provides smooth cushioned moves easy on the whole machine.

Complicated gear trains are eliminated by simple, independent, motor-driven swing units. The machinery is driven from the main motor through a special oil enclosed transmission unit. Revolving frame, A-frame and house frame are all combined into a single strong bridge-truss. Tubular lacing is lock-welded, simplifying and strengthening the graceful and efficient Monighan boom.

The success of the Bucyrus-Monighan can contribute to your success on dragline operations.

BUCYRUS MONIGHAN

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shipbuilding and transportation facilities could be made available in the time required to construct the project, which would be done jointly with Canada, the president said:

"Production and more production is the keynote of our all-out race for national defense."

Electric power and transportation are limiting factors in the production of planes, guns, tanks and ships.

"The enemies of democracy are developing every hydroelectric resource and every waterway from Norway to the Dardanelles. Are we to allow this continent to be outmatched because short-sighted interests oppose the development of one of our greatest resources?"

Mr. Roosevelt declared he had been advised that the project could be built in four years, but he added:

"Under emergency pressure it may be completed in less time. I should like to agree with the people who say that the country's danger will be over sooner than that.

"But the course of world events gives no such assurances; and we have no right to take chances with the national safety.

"I know of no single project of this nature more important to this country's future in peace or war. Its authorization will demonstrate to the enemies of democracy that, however long the effort, we intend to outstrip them in the race of production. In the modern world, that race determines the rise and fall of nations."

The president told congress that its action would "either make available or withhold 2,200,000 horsepower of low cost electric power for the joint defense of North America" and would "either open or keep bottled up one of the greatest transportation resources ever offered a people."

Mr. Roosevelt said that the present aluminum program called for more than 10,000,000,000 kilowatt hours a year and was constantly expanding "with the need for more planes to outstrip the aggressors."

Declaring that bottlenecks in transportation were as serious as shortages of power, he said the railroads were being burdened with expanding production and the seaway would provide a "great highway to and from important defense production areas."

"It will cut by more than a thousand miles the stretch of dangerous open water which must be travelled by supplies to Great Britain and strategic north Atlantic bases," the president said.

The St. Lawrence project, which would open an oceangoing seaway from the Great Lakes to the Atlantic and provide for increased power facilities on the Canadian-American border in northern New York, originally was presented to congress in treaty form. It failed of ratification when the senate refused to give it the required two-thirds vote.

The cost to the United States has been estimated at $285,000,000, upward of $90,000,000 of this to be repaid the government by New York state for use of the increased power to be generated at the International rapids section of the river.

Supreme Court Upholds Denison Dam Decision

By Bethune Jones

In what appeared to be removal of virtually the last remaining premise upon which the federal government's far-reaching public power-flood control program could be challenged in the courts, the United States Supreme Court, in a decision handed down June 2, extended the power of flood control to include tributaries of navigable streams and held that there is no constitutional necessity for viewing each reservoir project in isolation from a comprehensive plan covering the entire basin of a particular river.

The decision upheld a lower tribunal's dismissal of a suit by Governor Leon C. Phillips of Oklahoma, which challenged the government's right to build a $54,000,000 dam across the Red River between Texas and Oklahoma near Denison, Texas.

Governor Phillips had protested that 100,000 acres of Oklahoma would be

(Continued on page 420)

WE'LL BE THRU ON TIME THANKS TO GATKE FRICTIONS

"You sure pulled the fat out of the fire when you suggested GATKE Swing Frictions," he says. *"It's amazing how much time they have saved. We'll be thru on schedule — if not before."*

"Now look at this," he says and showed me a big broadside, *"GATKE also makes Brake Lining and Clutch Facings for Trucks, Tractors, Trailers and all kinds of excavating, road building and construction equipment. From now on we are using GATKE Asbestos Friction Products for all requirements."*

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Shots . . .

(Continued from page 416)

inundated, much of it being valuable oil and farm land; that Oklahoma's boundary would be obliterated for 40 miles and that state subdivisions would lose $40,000 annually in taxes. In challenging the constitutionality of the project, he argued that flood control and power features of the dam were physically separable and contended the government's authority over navigable streams could not be expanded legally to include a power dam.

In a unanimous decision, written by Justice William O. Douglas, the Supreme Court pointed out that it recently recognized that flood protection, watershed development and recovery of the cost of improvements through utilization of power were functions in whcih congress could engage under the commerce clause of the Constitution.

"And we now add," the decision stated, "that the power of flood control extends to the tributaries of navigable streams. For just as control over non-navigable parts of a river may be essential or desirable in the interests of navigable portions, so may the key to flood control on a navigable stream be found in whole or in part in the flood control on its tributaries."

"There is no constitutional reason why congress cannot under the commerce power treat the watershed as a key to flood control on navigable streams and their tributaries," the opinion added. "Nor is there a constitutional necessity for viewing each reservoir project in isolation from a comprehensive plan covering the entire basin of a particular river. We need no survey to know that the tributaries are generous contributors to the floods of this Mississippi. And it is common knowledge that Mississippi floods have paralyzed commerce in the affected areas and have impaired navigation itself."

In ruling that "the Denison Dam and Reservoir project is a valid exercise of the commerce powers of congress," the court also stated:

"The fact that congress has introduced power development in this project as a paying partner does not derogate from the authority of congress to construct the dam for flood control, including river flow."

Sauerman Scraper Machine with travelling tower loads 200 cu. yd. of clay per hour from pit into cars.

Sauerman Slackline Cableway digs hard-packed gravel and conveys 35 loads per hour to screening plant.

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SAUERMAN Machines are backed by over 30 years of specialized experience in designing this type of equipment. We give you an expertly engineered unit, designed and built to meet your exact requirements and whether it is a machine to handle 10 tons per hour or many thousand tons per day it will be simple and economical.

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Los Angeles Seawall Contract Let

By John R. Marcy

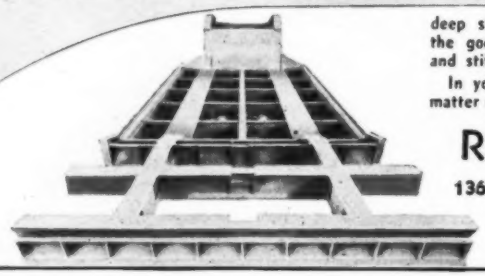
The contract was recently let for a breakwater extension that will give Los Angeles the largest man made harbor in the world and protect the navy's anchorage from southeast storm winds.

Successful bidder on the war department's specifications was the Columbia Construction Company of Oakland, California. The cost of the job will be $10,321,200, and construction will begin as soon as bonds are approved. Nine hundred working days will be allowed for the completion of the contract.

The new seawall extension will add about six square miles to the protected area of the harbor, east of Long Beach. It will follow approximately the 50 foot contour of the ocean's bottom, at depths varying from 45 to 60 feet.

Rising 14 feet above high tide, the breakwater is 300 feet wide at the base at its deepest section. It will have a

You Get EXTRA "BACKBONE" in a ROGERS TRAILER



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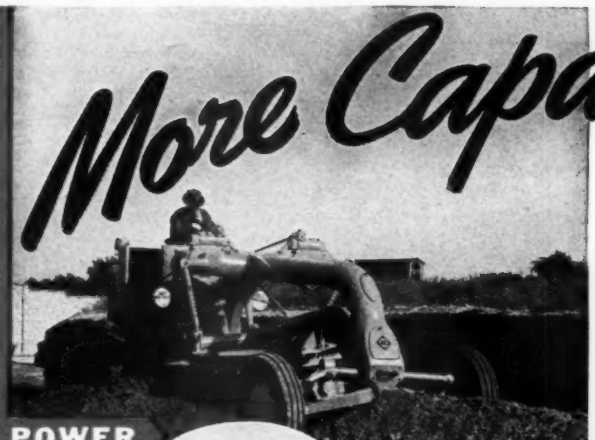

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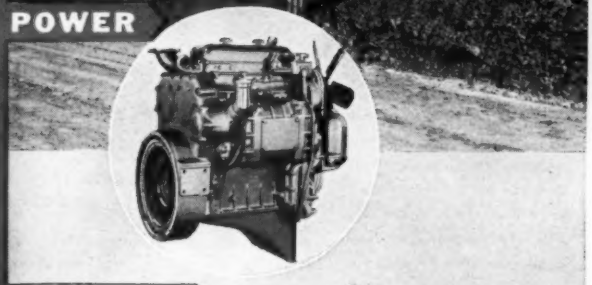

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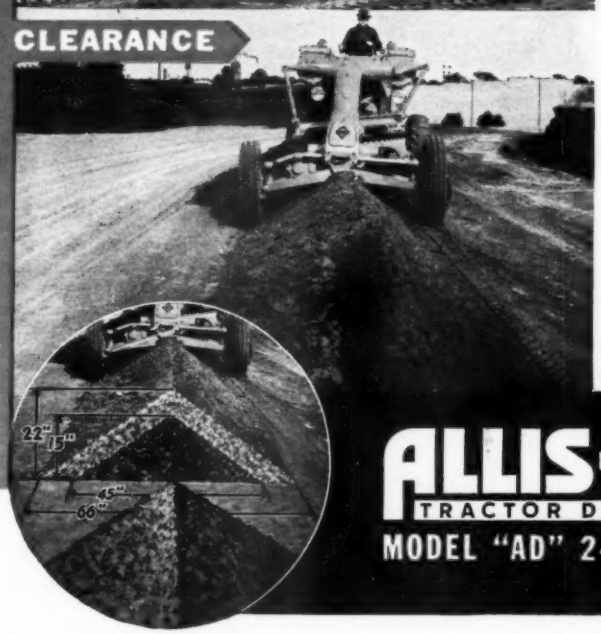
CLEARANCE



More POWER!

The push behind the blade first depends on the power of the engine. How much energy does the engine develop, how does it act under overloads? These factors determine the kind of work you can handle with your grader and the speed with which you can do each job. The model "AD" develops 75 Diesel brake h p.—more energy packed in this grader than any other outfit ever built. Smooth power—so quiet it sounds almost like a regular auto engine. Hangs on to overloads with the tenacity of steam power—reserve torque enables you to throttle down to half speed without decreasing the load on the blade. In addition, starts instantly . . . *operates on ordinary Diesel fuels.*

More TRACTION

No matter how much power you pack into a grader it doesn't mean a thing unless you have the traction to make use of it. To get this necessary traction you need to balance your machine so that a greater part of the weight will fall on the rear wheels. That is exactly how the "AD" motor grader is balanced. A higher percentage of its 21,500 lbs. falls on the rear wheels than does that of any other motor grader. It assures you that all the energy from the "AD's" powerful engine is going where it belongs . . . right to the blade. This enables you to handle the hardest kind of work with unusual ease—from deep, tough scarifying to high, heavy bank cuts.

More CLEARANCE

Power and traction alone is not enough. You must have ample clearance. In fact, a motor grader's capacity is limited by its clearance. When material pushes up into the axle or circle you are pushing it instead of rolling it. This sets up resistance . . . therefore causes power loss. That's why the "AD's" extra clearance under the front axle and circle is so important. *Enables it to handle twice as much dirt as ordinary graders.* This is proved by a cross-section of a windrow marked off in triangles comparing the "AD" capacity with other graders—note lower left photo. Figure out the areas—prove it to your own satisfaction. *You will find that the "AD" handling a 22" windrow moves twice as much dirt every foot it travels as do ordinary graders moving only 15" windrows.*

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MODEL "AD" 2-CYCLE DIESEL MOTOR GRADER

More power plus more traction plus *extra* windrow clearance and a full range of blade positions gives the "AD" an earth-moving capacity the like of which you've never before known.

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Power to grab a boulder and tear it loose. Weight to penetrate and bite out a full pay load. Watch 'em work—or ask any man who owns one. All sizes available. Wire or write for prices. Descriptive Bulletins on request.

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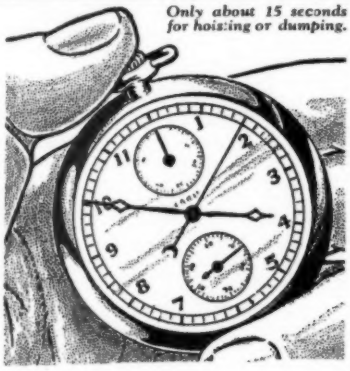
LOAD LUGGER

The Brooks system of loading and dumping buckets in rotation while the men fill the empties is a proven method of speeding up the work 50% or more on road jobs, excavating and other material handling operations.

One contractor reports: "The yardage moved with a Load Lugger and 5 buckets equals that of four other trucks." Another says: "The Load Lugger has replaced 3 dump trucks and reduced our cost 25¢ per ton.



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sand-clay base and a sand core protected by 12 feet of rock to within 10 feet of low water. Above that level the wall will be of solid rock, in the largest masses it is practical to quarry and transport. Rock for such purposes has usually been obtained from Catalina Island and brought over in barges, but a superior quality granite is found inland at Riverside, so that it is possible that it will be quarried there.

The navy is now building a 6,000 foot extension of the breakwater from a point opposite the flood control channel eastward. The section to be built by the war department begins 1,800 feet east of this section under construction, leaving a channel of that width.

It continues eastward for 10,800 feet, and northeast for 2,350 feet more to within 8,000 feet of the Orange County shore.

Announce Pan-American Highway Congress

Plans for the Fourth Pan-American Highway Congress to be held in Mexico City September 15-24, 1941, have been announced by that organization's publicity committee.

Principal topics that will be discussed at the congress include: Highway System Planning, Construction and Maintenance, Finance and Management, Legislation and Safety and International Matters.

Friant Dam Ahead of Schedule

With construction considerably ahead of schedule, Friant Dam passed the millionth cubic yard mark on June 1, bringing its concrete content to almost half its final volume of 2,200,000 cubic yards.

Friant Dam is rapidly catching up in size with Shasta Dam its elder and ultimately larger brother in the Central Valley Project, according to R. S. Calland, acting supervising engineer. Mr. Calland said concrete pouring at Friant has averaged 175,000 yards a month and at Shasta 135,000 yards a month since the first of the year. Shasta passed the million yard mark on May 3 and now contains 1,165,000 yards, about one-fifth its final volume.

Considering concrete in place, Shasta and Friant already are the two largest masonry structures in California, both exceeding Hetch Hetchy Dam's 935,000 yards.

Friant Dam has a record 24-hour pour of concrete slightly ahead of Shasta's. On March 23 the Friant contracting firm, Griffith Company & Bent Company, poured 7,634 yards—which is enough concrete to pave more than three miles of a two-lane highway.

Anticipating the completion of Friant Dam by perhaps the latter part of 1942, the Bureau of Reclamation is ordering water control machinery well in advance of the time it will be needed for installation.

Meantime, work is going on at Friant on all phases of construction, from excavation to concrete placement.

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There's a HERCULES EXPLOSIVE for Every Contracting Need

REGARDLESS OF THE BLASTING INVOLVED, there's a Hercules explosive designed to do the work efficiently and economically. This list of Hercules explosives available to contractors includes all the old standard dynamites, plus grades that were developed to reduce costs and promote efficient blasting. One or more of the explosives listed below will be suitable for the work you have in progress or in prospect.

Gelamites* 1 and 2—The original semi-gelatin. Gelamite 1 replaces 60% gelatin and Gelamite 2 replaces 40% and 50% gelatin, cartridge for cartridge, at a saving of 10% to 15%. Lower strengths of gelatin are replaced by Gelamite 2 at a saving by reducing the number of cartridges in the charge. The Gelamites are sufficiently plastic and water resistant for most work. 224 to 244 cartridges, 1¼" x 8", in 100 lbs.

Hercomites* 2 to 7—The Hercomites, high-count ammonia dynamites, are the most economical explosives available. They are particularly suitable for open work, where they frequently save from 10% to 30% when substituted for Extra Dynamite or other grades. Hercomite Bag is a free-flowing explosive and is the most economical bag powder.

Cartridge for Cartridge Replacement Table Comparison of Hercomites 2 to 7 With Other Explosives

	Approximate No. 1¼" x 8" ctgs. per 100 lb.	Approximate weight strength	Nearest Extra grade by bulk
Hercomite 2...	240	65	50%
Hercomite 3...	260	65	40%
Hercomite 4...	280	65	40%
Hercomite 5...	306	65	30%
Hercomite 6...	330	65	25%
Hercomite 7...	350	65	20%

Extra Dynamite—Strengths: 20% to 60%. 216 to 220 cartridges, 1¼" x 8", in 100 lbs. For general all-round work. Extensively used for clay blasting, road construction, stump and boulder blasting, quarrying, and electrically fired ditch blasting.

Straight N. G. Dynamite—Strengths: 20% to 60%. 208 to 220 cartridges, 1¼" x 8", in 100 lbs. Sensitivity of the 50% and 60% grades adapts them to propagated ditch blasting, and for accelerating fill subsidence in constructing roads through swamps. Also used for demolition (40%-60%), mudcapping hard boulders (40%-60%), and submarine blasting (60%).

Herculites*—Strengths: 20%, 30%, and 40%. They are free-flowing, ammonia type powders, packed in bags. Satisfactory for general blasting where free-flowing powders of this strength are needed. Herculite 2 (20%) is used for gully blasting in controlling soil erosion.

Gelatin—Strengths: 20% to 80%. 164 to 204 cartridges, 1¼" x 8", in 100 lbs. It is dense and plastic; is more water resistant, less bulky, and produces a smaller amount of objectionable fumes than other high explosives. Particularly desirable where concentrated loads, or great resistance to water, are required.

Gelatin Extra—Strengths: 25% to 90%. 180 to 208 cartridges, 1¼" x 8", in 100 lbs. Water resistance and fumes satisfactory for tunnelling, mining, and quarrying. Gelatin Extra has almost entirely replaced Gelatin grades for reasons of economy; but for the same reason, Gelatin Extra is often replaced by the Gelamites.

Blasting Gelatin—Strength: 100%. 206 cartridges, 1¼" x 8", in 100 lbs. The strongest and fastest commercial explosive. It is dense, waterproof, and has excellent fumes. Used for shooting oil and gas wells, for loading in the bottom of deep well-drill holes in very hard rock, cut holes in hard-rock tunnelling.

Hercules Blasting Supplies—Hercules also makes a complete line of blasting caps, and electric blasting caps, No-Vent* All Metal Delay Electric Blasting Caps, waterproof electric blasting caps, and other blasting accessories. They are all characterized by reliability and uniformity of action.

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Santee-Cooper

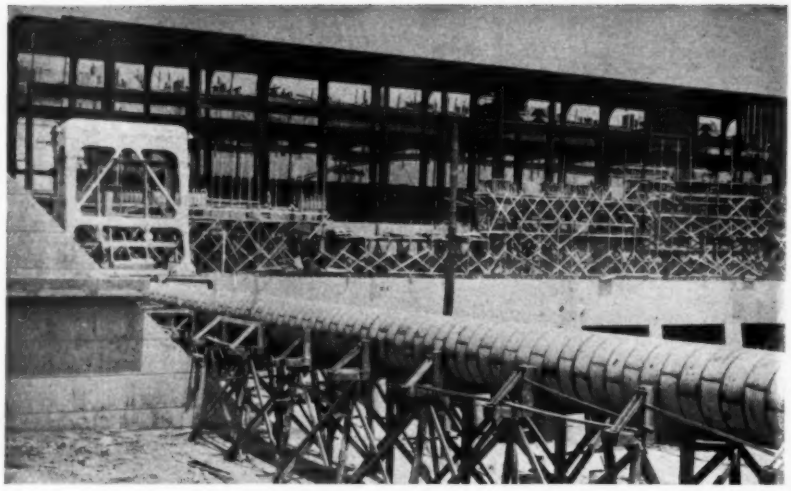
(Continued from page 403)

raska Public Power and Irrigation District. In addition, the Terteling organization built Unity, Rye Patch and Hiram Dams in the West, and handled reconstruction work in the Fort Peck area. All in all, J. A. Terteling and Sons have handled a whale of a lot of dirt in any man's language. One testimonial to the skill with which they work is the fact that they received the 1940 A. G. C. award for safety in the heavy construction division.

L. J. Montgomery is superintendent for J. A. Terteling & Sons' Santee-Cooper work. Paul Varner is engineer; N. R. Nichols, office manager; Gene Flaherity, drilling foreman; and Fred Kennedy, dike foreman. The local company office is at Bonneau, S. Carolina, where the above personnel and their families live in trim cabins built by the company.

South Carolina Public Service Authority, a body created by the State Assembly, is in general charge of the entire Santee-Cooper project. The Harza Engineering Co. are designing and supervising engineers. The $40,795,000 cost of the project is met by a $15,435,000 P. W. A. grant, an $18,865,000 loan secured by self-liquidating revenue bonds issued by the S. C. P. S. A., and $6,495,000 which represents the cost of clearing the basin area, a W. P. A. job.

In view of the National Defense Program, Santee-Cooper assumes a significance not emphasized when it was planned. It can serve as the basis for a new industrial center to speed up and to give geographical diversity to the production of goods necessary for the safety of the country.



• Santee-Cooper's power house is a reinforced concrete and glass brick structure 380 feet long. Initial installed capacity is 173,300 h.p. with an eventual total of 213,300 h.p.

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DIGGING POWER!

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Williams Buckets and Parts are carried by distributors in all parts of the country. Bulletins covering Williams Power Arm, Multiple Rope, and Dragline Buckets sent on request.

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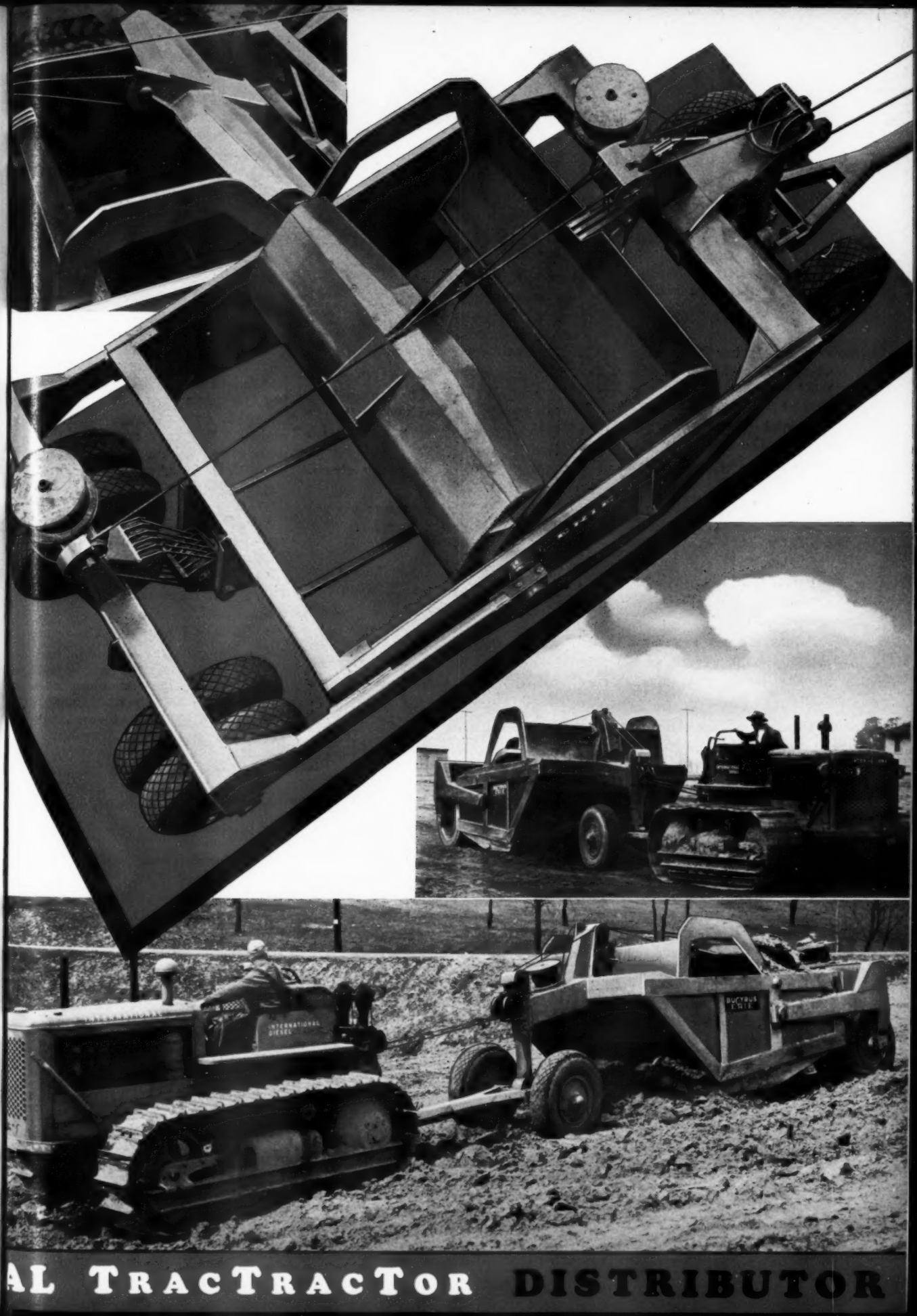


AL TRACTRACTOR DISTRIBUTOR

NOT in the *Contract*

The applicant for the job of chief engineer proudly spread out letters of recommendation from two ministers.

"Say," said the superintendent, "we don't work on Sundays. Haven't you a reference from someone who sees you on week days?"

First Boxing Manager: "Now, at the end of the second round your man hits mine on the chin, and he goes down for the count."

Second Manager: "No, Bill, make it the eighth or ninth; we gotta play fair with the public."

A good husband always feels in his pockets whenever he passes a mail box.

"Here is a letter from your wife saying you are the father of a ten-pound boy."

"Does she say anything else?"

"That's all, except at the end of the letter she says, 'Truly yours.'"

Golfer (far off in the rough): "Say, caddy, why do you keep looking at your watch?"

Caddy: "It isn't a watch, sir; it's a compass."

She was pensive when I met her,
Sadness was on her brow.
But my checkbook made her happy,
An she's ex-pensive now.

Asylum Inmate (to farmer driving by with a load of fertilizer): What are you going to do with that?

Farmer: Put it on my strawberries.

Inmate: That's funny; we put sugar on our strawberries.

"I can't marry you," said the justice of the peace. "If this girl is only seventeen, you will have to get her father's consent."

"Consent," yelled the groom-to-be. "Say, who do you think this old guy with the rifle is, Daniel Boone?"

"Now put mine in Old English, Elmer!"

If you have a friend you want to lose, try this riddle on him.

What's flat at the bottom, pointed at the top and has ears?

Answer: A mountain. The ears? Come, come — you've heard of mountaineers.

Irate Judge: "Say, Brown, didn't I tell you the last time you were here that I distinctly didn't want ever to see you again."

Brown: "You surely did and I wish you'd tell these officers that. They wouldn't believe me."

They were training Mandy in her duties as maid. Upon answering the phone the first day she brought no message but explained: "Twarn't nobody, jes a man says, 'It's a long distance from New York,' and I says, 'yes-sir, it certainly is.'"

One firefly flew excitedly up to another firefly in Hyde Park, London, and said:

"Put out that light! Douse it. Don't you know that this is a black-out?"

"How can I help it? When you gotta glow, you gotta glow!"

It is easy to borrow money at a bank if you can present enough evidence to show that you don't need it.

Customer: "Does Smith drink much?"

Bartender: "Yes, he's one of our unsteadiest customers."

Murphy (promoted to chief engineer)—"An' look here, boys, yees'll do as I tell yees or get fired, for I can lick anny man in this plant."

Husky Fireman—"Ya can't lick me."

Murphy—"Then yer fired; I won't have anny man on this job I can't take up."

First Old Maid: "Do you always look under your bed at night?"

Second Old Maid: "Yes, always."

First Old Maid: "Ever find anything?"

Second Old Maid: "Only in the lower-priced hotels."

A Real Combination for BIGGER DOZING PROFITS!

20 USES of Buckeye Power Control Units

DIRT MOVING

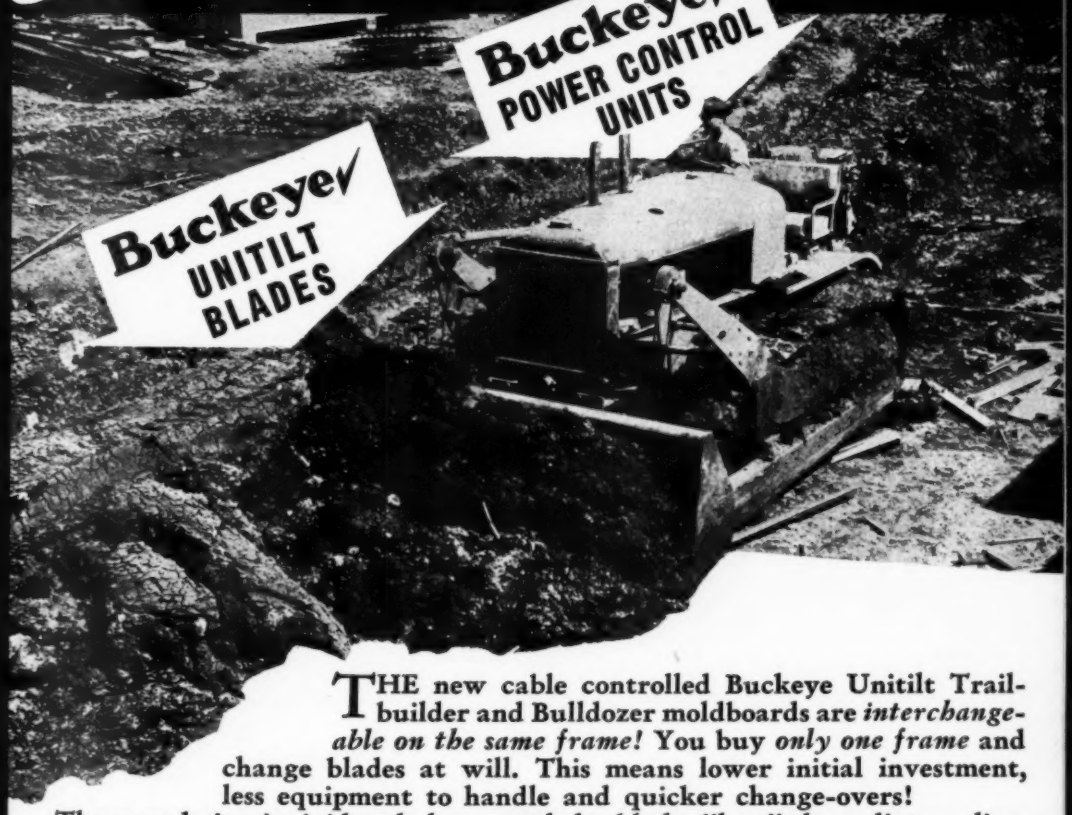
- PULLING DOUBLE OR SINGLE LINE SCRAPER
- OPERATING WITH TRAILBUILDER OR BULLDOZER UNITS
- PULLING A THREE OR FIVE TOOTH RIPPER
- OPERATING A PUSHER BEHIND SCRAPER
- COMBINATIONS OF THE ABOVE

R WITH TRIPOD ATTACHMENT

- PILE DRIVER
- POST PULLER
- POST SETTING
- CULVERT PLACING
- LOADING AND UNLOADING HEAVY EQUIPMENT
- REMOVING OLD CULVERT ABUTMENTS FROM RIGHT OF WAY
- PAVEMENT BREAKER (with nut-tracker)

—OR HOIST ONLY

- CLEARING RIGHT OF WAY, STUMPS, TIMBER, ETC.
- STOCKPILING DEBRIS FROM RIGHT OF WAY
- UPROOTING TREES
- MISCELLANEOUS HOISTING
- FREEING BOGGED DOWN WHEEL TYPE EQUIPMENT
- HANDLING SKID-MOUNTED EQUIPMENT UNDER DIFFICULT CONDITIONS
- OPERATING DOUBLE LINE CABLEWAY DRAG SCRAPER.
- PULLING CABLES THROUGH CONDUITS



THE new cable controlled Buckeye Unitilt Trailbuilder and Bulldozer moldboards are *interchangeable on the same frame!* You buy *only one frame* and change blades at will. This means lower initial investment, less equipment to handle and quicker change-overs!

The new design is rigid and close-coupled—blades "hug" the radiator, eliminating excessive load on front idlers and track rollers. Blades are easily angled, easily tilted.

In addition, you get the outstanding Buckeye blade curvature that gives you natural digging action with no mechanical means of creating down pressure—an action that *rolls* the dirt forward instead of pushing it as a dead weight. This gives you bigger payloads with the same horsepower, less strain on the tractor.

Combine with this the powerful, lightning- fast, fingertip control of Buckeye Power Control Units and you have an unbeatable combination for faster earth-moving, lower costs and bigger profits!

Write for specifications and literature today.

BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Built by Buckeye✓

nvertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

Ft. Leonard Wood

(Continued from page 399)

crusted and frozen, the bull-graders were also helpful in breaking up the surface so that the scrapers could tackle the job.

All excavation work was performed under the general direction of Bob McCune, KNWL's big, hearty general superintendent. Superintendent McCune appointed Tom Knobel, an old timer who has done many an earth moving and building job himself, as his assistant. Between McCune, Knobel and the army officers very close cooperation existed all through the job.

Excavation Operations Divided

The scraper work around the camp site had to be done while the ground was saturated, and while a shortage of haul roads existed. The job was therefore divided up into a number of smaller excavation projects, and hauls were kept down around 800 feet or even less. Purely from necessity, because the nature of the soil demanded it, the excavation was all deposited in the closer dump area. In a way that was a good thing. It helped automatically to coordinate the equipment.

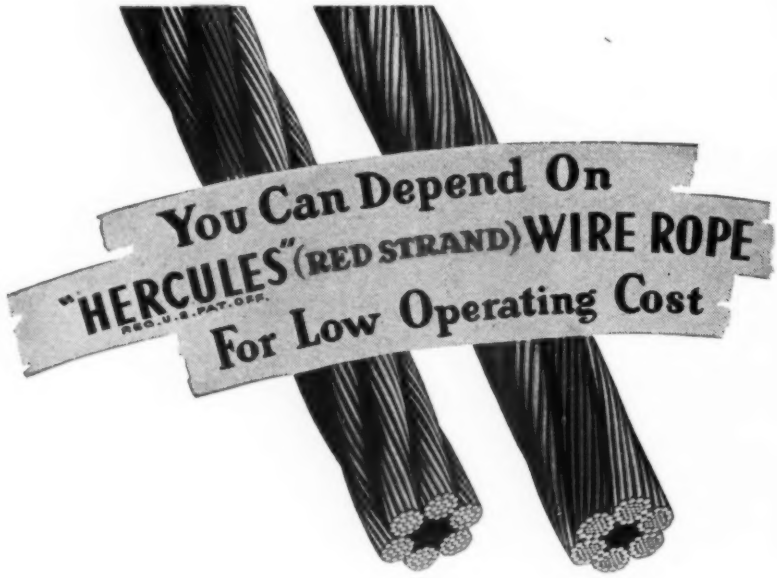
As soon as possible the buildings were started. Construction on them began while the freshly graded land was still so soft that lumber trucks, concrete mixers and material trucks had to be pulled through the mud. This building proposition, however, despite all the mud, was well organized and incorporated all the best features of assembly line methods into the set-up.

Foundations for the laundry, filtration plant, sewage disposal plant, and for the messhalls and barracks of the fort were laid out by a survey party. Following closely on the heels of the layout crew came the fine graders, who finished the site and dug the necessary trenches to key the concrete into the subgrade. A rough carpenter crew set up the forms, and concrete was started as soon as freezing weather abated.

Roughing out the skeleton framework of the buildings, plumbing, roofing, electrical work and painting all followed in rapid sequence. As fast as the ground was laid open and graded new buildings started up. Insofar as possible, work was completed as it was carried through, leaving no uncompleted or unstarted buildings in any area. The progress of the job was carried on until all construction centered on one unfinished area. It was something like a pincer movement in military tactics; closing in from all sides to get the job finished.

The job was so big that progress had to be charted as the buildings went up in order to keep all the crews moving as efficiently as possible. With 32,500 men all working at one time, a job must be well organized to get work done. That was the case at Leonard Wood.

Simultaneously with the erection of the buildings came all the trench work in the center of the wide streets of the little city. Over 60 miles of water lines and 52 miles of sewer lines were laid under the ground at Fort Leonard



Correct construction is also an important factor in wire rope economy. In "HERCULES" there is a right rope for every purpose, as it is furnished in both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type.

PRODUCTION requirements must be met. Why not let "HERCULES" (Red-Strand) Wire Rope help you meet this demand and still maintain a reasonable margin of profit?

You can rely on "HERCULES" to keep costs down, because it is made on the principle that—*"With wire rope it pays to use the best"* . . . In its entire process of manufacture, exacting tests and rigid inspections leave nothing to chance. All this, plus manufacturing efficiency, means longer rope life at no higher cost.

You will quickly discover that "HERCULES" (Red-Strand) Wire Rope is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production. Specify it on your next requisition.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

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For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.

Buckets of Profit with RED ARCH

A RED ARCH dragline bucket equipped with the new RED ARCH drag chain is a combination hard to beat. Faster digging, longer service, lower costs and surer profits are points every dragline owner is interested in . . . that is why every dragline owner will be interested in RED ARCH buckets.

Try a RED ARCH bucket and convince yourself that the streamlined construction eliminates excess weight; gives better balance for bigger loads; is faster dumping; has greater strength and durability —to save you money in every way.

A quicker fill . . . a smoother carry . . . a cleaner dump: these are performance features which place RED ARCH buckets in high favor with owners and operators alike. Because of their lighter weight, they often permit operators to use larger buckets on their present machine, thus moving more dirt per cycle!

Investigate RED ARCH yourself . . . soon. It pays . . .

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

• The Army's 27 miles of railroad, connecting the camp with the main line, called for some heavy excavation. Here a blast is set off to aid in right-of-way excavation.

Wood. Three Bucyrus-Erie 10-B machines, equipped as trench excavators, worked with two Lima Paymaster trench hoes and several Parsons excavators to get the water lines laid as soon as possible. Owing to the freezing winter climate, it was necessary to lay lines deeper than would have been the case farther south where the climate is less rigorous.

Swinging ⅜ yard buckets, the 10-B machines cut out about 35 to 50 cubic yards of hardpan and clay per hour from the sewer trenches. Because the machines were light, and because the bullgraders had already taken the softer material off the surface of the ground, it was not necessary to use crawler mats under any of these machines. They stayed on top and if the going got too soft after a thaw some rock was dumped into the boggy place and the 10-B's kept right on going.

It was not until the work began on the 27 miles of army railroad, however, that heavy excavation began. This railroad line consisted of a single track with spur sidings, cutting through to the camp off the main railroad. It was a standard gauge track, with crushed rock ballast. Its construction involved the removal of 1,500,000 cubic yards of rock, clay and shale, and at least half of this figure was rock excavation. Time was running short. January 15th rolled around; January 20th; and finally on January 26th although conditions underfoot hadn't improved very much, McCune and Knobel decided that the weather wasn't going to get better anyway and that they'd better make a stab at the job.

Bullgraders Strip the Hillsides

The ten International mounted Bucyrus-Erie bullgraders, being very admirably suited to pioneer work in stripping a hillside, were brought in along with everything else that would dig. Pioneering here was treacherous. The hills were steep, some of the ground was mushy and other parts of it on north hillsides were frozen. Where the clay was soft and mushy the bullgrader blades were used straight, at right angles to the longitudinal axis of the tractor, so that a good batch of earth could be pushed out of the way. Where the ground was hard, the blade was tilted at an angle so that one corner of it could be forced into the hard material, opening up a cut. One of the nice features about the arrangement of this Bucyrus-Erie blade is its quick interchange. A good operator with a ball peen hammer can change the arrangement of the blade in a few minutes.

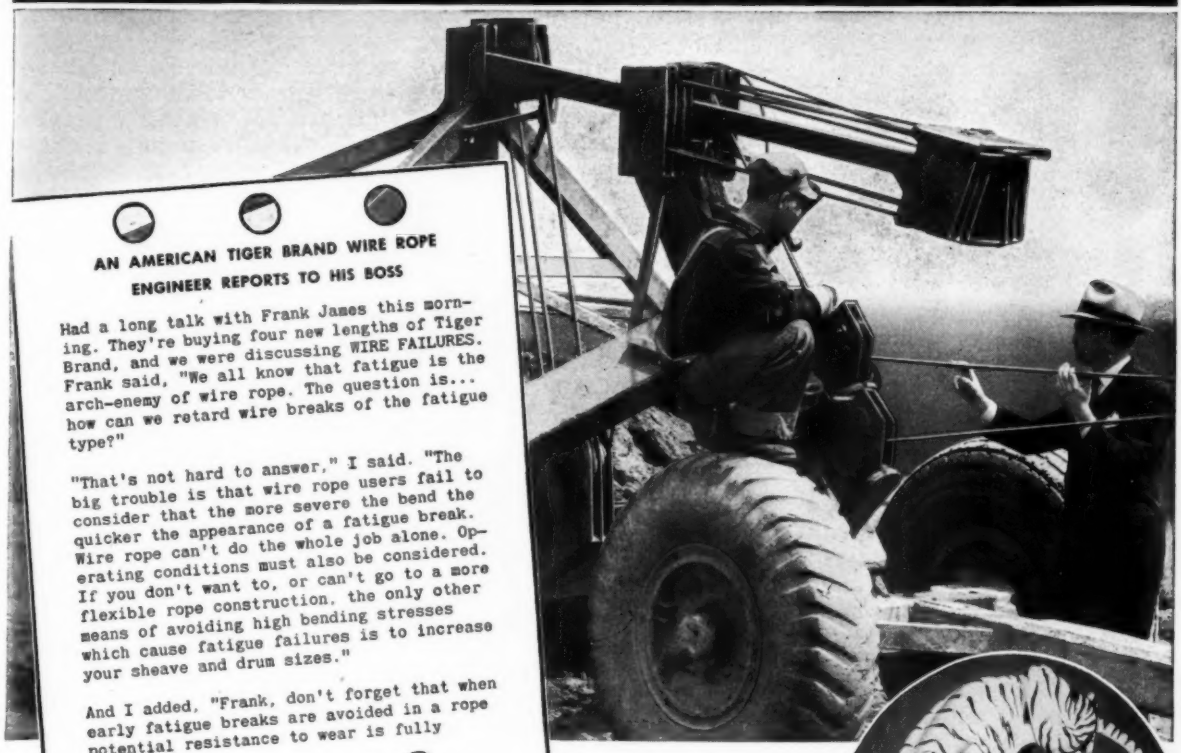
All of this stripping was necessary before the drilling rigs could be brought in to drill the holes for the explosives. They moved in as soon as possible, however, and began drilling 4-inch diameter holes through the limestone. The rock, although it laid flat, was unusually hard. From six to eight feet of hole per hour with the wagon drills was exceptional, and more often than not the toughness of the material made a smaller figure the rule. Drill bits dulled and had to be resharpened. A steady stream of resharpened bits kept coming out, however, and the only lost time was the time of changing them.

According to Tom Knobel, more than a pound of 40% gelatin was used per yard to shoot down the rock. While this is fairly high, he explained, it must be borne in mind that the rock was tough, and that it had to come out fractured sufficiently to load out in dippers as small as one cubic yard. Every effort had to be made to get away from any secondary shooting, or of taking up "high bottom" after the initial blast. By shooting strong, the rock came out thoroughly broken, and Tom Knobel was able to avoid high priced delays to shovels and wagons which certainly would have resulted if the rock had come out too big to load.

Then, too, much of the rock was loaded out by the larger shovels into earth hauling machines and put into one of the many fills along the line. To get a good compact fill, big stones were not wanted. That was another reason for breaking them down to small size in the initial blast.

The loading of this blasted rock

"FATIGUE is the Arch-Enemy of Wire Rope!"



AN AMERICAN TIGER BRAND WIRE ROPE ENGINEER REPORTS TO HIS BOSS

Had a long talk with Frank James this morning. They're buying four new lengths of Tiger Brand, and we were discussing WIRE FAILURES. Frank said, "We all know that fatigue is the arch-enemy of wire rope. The question is... how can we retard wire breaks of the fatigue type?"

"That's not hard to answer," I said. "The big trouble is that wire rope users fail to consider that the more severe the bend the quicker the appearance of a fatigue break. Wire rope can't do the whole job alone. Operating conditions must also be considered. If you don't want to, or can't go to a more flexible rope construction, the only other means of avoiding high bending stresses which cause fatigue failures is to increase your sheave and drum sizes."

And I added, "Frank, don't forget that when early fatigue breaks are avoided in a rope potential resistance to wear is fully realized."

George

NUMEROUS conditions affect wire rope life, but none limits normal efficiency more than severe bending. Wire ropes are manufactured in various constructions for the purpose of securing varying degrees of flexibility. However, increased flexibility is secured at the sacrifice of resistance to abrasion, because greater flexibility is produced by increasing the number of wires in a wire rope which means that the size of the individual wires is correspondingly reduced. In order to secure satisfactory rope life it is necessary to specify a rope construction composed of wires of a large enough diameter so that they will not wear through in a comparatively short time. However, if the sheaves over which the rope operates are not of adequate size, bending stresses will be imposed which will cause wire breaks of a fatigue type and consequent removal of the rope at an early stage, even though the wear is slight. The smaller the size of sheave, the earlier these fatigue breaks will occur and the less the potential resistance to failure from abrasion will be realized.

Give these matters the attention they deserve and replacement of wire rope will be much less frequent. You'll get longer cable life.

Excelday Preformed

Rely on the advice of the American Tiger Brand Wire Rope Engineer. These men can make recommendations which will correct the difficulties you are encountering. They will work with you, without obligation, to help you secure a full dollar's value out of every dollar you invest in wire rope.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

UNITED STATES STEEL

For your convenience in writing to United States Steel Corporation Subsidiaries, you will find a card bound in this issue.

• All excavation work at Ft. Leonard Wood was under the general direction of Bob McCune, KNWL's general superintendent.

and shale proceeded under different conditions from those described in the camp proper. Most of the hauls were far too long to use scrapers. Twenty Allis-Chalmers Speedaces of 6-yard capacity, 10 six-yard Koehring Trail Dumps, 35 Euclid wagons from 8 to 18-yard size, both bottom and end dump, 15 Koehring Dumptors, 10 Hugs and 3 Linn trucks were used under the shovels to haul out this rock. With all this equipment working in a relatively close space one can readily see that it took a great deal of management to keep things rolling. One rule was strictly adhered to. Any machine that was being loaded was headed for the dump area. They didn't lose time turning with a load.

Complete Maintenance Program

Six central maintenance shops had to be set up to service equipment and take care of the necessary operating repairs. At the time the job was going strongest, a peak load of 180 mechanics was used on heavy equipment alone. Working 24 hours per day, the contractors pushed the job along, worrying whether or not it would be completed on time but nevertheless making progress.

As soon as a section of railroad was ready and the roadbed could be spared from rock hauling machines, the ballast, ties and rails were placed. A big rock crushing plant for making this aggregate was set up. On the 19th day of April, just a little better than three months from the starting date, the first train chugged down the 27 mile line. The job was finished on schedule.

The men on the job are proud that no strikes or labor trouble of any kind occurred during the life of construction. On a job where the payroll checks for one week, if laid end to end, would reach 9¾ miles, that is an accomplishment for which everyone concerned should be justly proud. In the brief months of construction, a safety program was organized which saw the lowest employee injury score at the time when the personnel numbered the highest. It saw things move efficiently, orderly, and with a purpose.

It is small wonder, then, that Major Frank Reed of the Quartermaster Corps and his contractor associates, as well as the whole state of Missouri point to this project with a great deal of pride in showing just what can be done under difficulty with modern machinery when human purpose and effort are united.

97.6% Calcium . . .

(Continued from page 409)

retained in the bins. Oversize is returned to a hammermill for recrushing. Normally eight sizes of stone are made, the smallest being screened agricultural limestone. A gyratory screen 24 feet long by 3 feet 4 inches in diameter, one section of which is jacketed, drops the sized stone into the various bins.

Planned Storage Facilities

Present storage capacity includes two 400-ton bin sets and a stock pile set-up being built up by the 1020 shovel. Storage bins are ingeniously constructed of timber and angle irons. Stone is hauled from the plant by truck. The company itself operates four 6-ton units, two Chevrolets, one Ford and one G.M.C. Rented trucks help out where demand is extra high, and purchasers do some hauling with their own units. All material is "weighed out" on a Howe platform scale.

A well equipped shop by the plant handles all necessary repair work. Drainage is handled by a Wisconsin self-priming centrifugal pump.

Plant No. 2 of the Riverview Company is located at Ruegg, Missouri, along the Missouri River just west of Lewis and Clark bridges. Riprap and foundation stone are the main "product" of this quarry. One hundred per cent utilization of the stone is achieved by crushing the chippings and pawls from this layer stone and using them to supplement production of Plant No. 1. Crusher capacity at this smaller plant is 60 tons per day.

J. C. Hail is president of Riverview Stone & Material Company, and we've rarely seen an executive who got more fun out of the operation he was handling and building. R. W. Meyer is vice president and secretary, and Virgil Czeschin is superintendent.

Tough Digging . . .

(Continued from page 407)

ply this by the many open cut mines throughout the Pennsylvania anthracite area and the answer is one of the toughest and largest excavating jobs in the business. The everyday routine of strip mining coal isn't as spectacular as superhighway construction, but hard rock and large yardages make the search for one of America's most important minerals a job for modern equipment coordinated by modern methods.

• Fred Meikrantz (right), superintendent of stripping and Fred Gabel, general foreman, keep men and machines rolling at the Stockton stripping.

Where to Buy BUCYRUS ERIE and BUCYRUS MONIGHAN Products

For Shovels, Draglines, Cranes, Clamshells, Skimmers, and Dragshovels 'Phone or Write the Nearest Dealer or Branch Office Listed Below.

For Large Shovels and Draglines, Walking Draglines, Bucyrus-Ruth Excavators, Blast-Hole, Prospecting, Oil Well, and Water Well Drills, 'Phone or Write the Nearest Bucyrus-Erie Branch Office Indicated Below with an *

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ARKANSAS, LITTLE ROCK: Lyons Machinery Company.
CALIFORNIA, LOS ANGELES. Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
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Canada

BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 63 Higgins Ave.
NEWFOUNDLAND, ST. JOHN'S: Newfoundland Tractor & Equip. Co., Ltd.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

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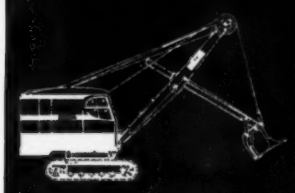
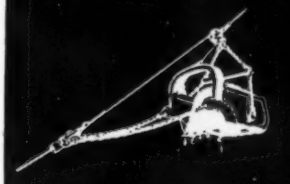
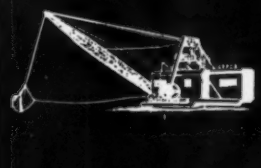
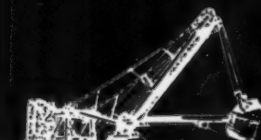
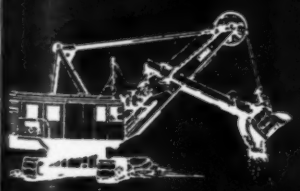
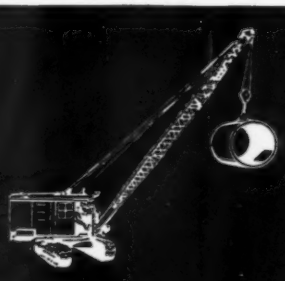
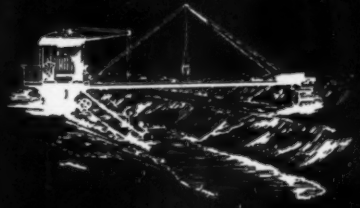


Notes from the manufacturers

Bucyrus-Erie Company, South Milwaukee, Wisconsin, has appointed the East Coast Equipment Company, Inc. of Miami, Florida, as distributors for their ⅜-yard to 2½-yard shovels, draglines, clamshells and lifting cranes. The territory consists of the counties of Dade, Broward, Collier, Glades, Henry, Indian River, Martin, Monroe, Okeechobee, Palm Beach and St. Lucie in the state of Florida.

The Lincoln Electric Company, Cleveland, Ohio, recently elected M. R. Dill as a director at its recent annual meeting of shareholders. Mr. Dill was also elected general counsel at the last meeting of the board of directors.

Chain Belt Company, Milwaukee, Wisconsin, has appointed A. W. Thomas and D. A. Kalton as assistants to the sales manager of the construction equipment division of the company. Mr. Thomas, a former district manager, has been connected with the company since 1927 in a sales and engineering capacity. Mr. Kalton has been with Chain Belt Company since 1932 and has served both in the home office sales department and as eastern district manager.

The Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed The Northwestern Road Supply Company, Lincoln Building, Watertown, South Dakota, to handle their complete line of construction equipment in certain sections of South Dakota.

The Logan Engineering Company, Chicago, Illinois, announces that J. A. McCoy, 1436 41st Place, Des Moines, Iowa, is now representing them in the entire state of Iowa. Mr. McCoy, an old-timer in engineering selling, has been serving Iowa industrials for more than twenty years.

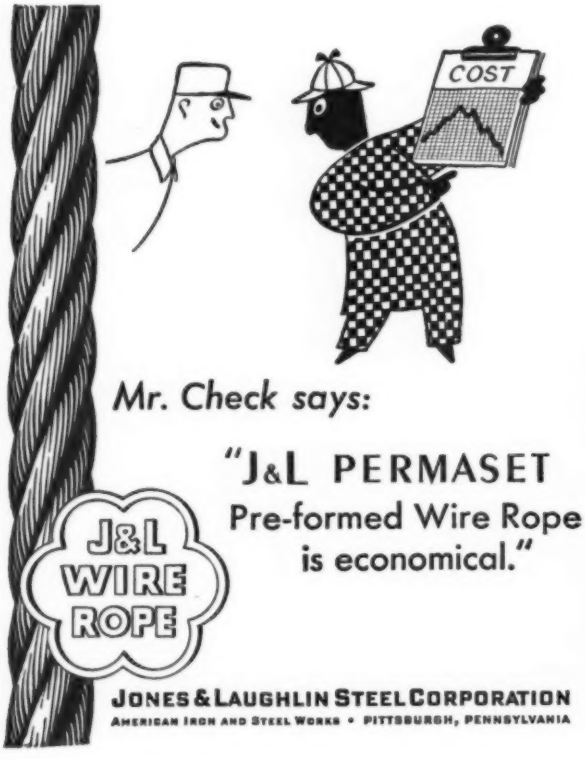
Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has appointed T. R. Langan, former traffic manager, assistant to the general manager of purchases and traffic, to represent the Westinghouse purchasing department in Washington. Mr. Langan has been with the company since 1904 when he enrolled in the engineering apprenticeship course. His experience includes work in the service department installation and operation of electric railway equipment, sales activities, manager of the Syracuse office and manager of the Northeastern district.

New trade literature

Title: **"Current Biography 1940"**
Subject: A 928-page book devoted to 1,002 biographies and over 650 photographs. The accomplishments of 29 modern engineering leaders in addition to facts about their personalities, personal history, and photos are included. Presented in a most complete manner, this book should be of interest to one and all alike.
Where to Get: The H. W. Wilson Company, 950 University Avenue, New York, New York.

Title: **"Turnable Conveyor Belt"**
Subject: The catalog section describes the belt's functions and reasons for its patented design, gives details on construction, and proper method of turning the belt.
Where to Get: The B. F. Goodrich Company, Akron, Ohio. Free upon request.

Title: **"Adjustable Speed Drive"**
Subject: New 4-page bulletin describing A-C adjustable speed drives between 1 and 15 horsepower for use over wide speed range. Simplicity, reliability and overload protection features are discussed. The method of operation



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Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.
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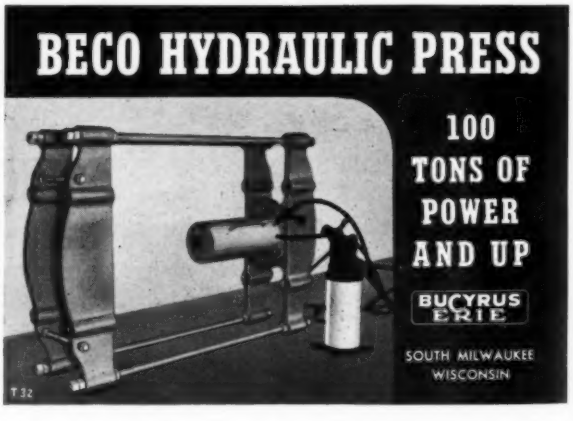

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Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

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With 20 years' experience of concrete work on all kinds of buildings, bridges, highway roads. Will go anywhere in United States. Best reference. Box 9165

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Can operate any kind of machine, large or small. Have had experience in quarry, ore and coal stripping. Familiar with grading work. Operate steam, diesel, gas or electric. Can do own repair work. Would like steady work in coal or ore fields. References. Box 9170

BLAST HOLE DRILL OPERATOR

Blast hole drill operator, 10 years' experience on gas, diesel and electric, large and small machines. Can do own repair work. Middle age, single and willing to go anywhere in U. S. A. Excellent references. Box 9160

EXPERIENCED OPERATOR

Operator with 20 years' experience on steam, diesel and electric draglines and shovels. Prefers steady work in rock quarry, gravel pit or strip mine. Tools. Experienced on repairs. Married, sober, reliable. Best references. Box 9166

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Fully experienced shovel operator—electric, gas or steam power. Familiar with back hoe work. Can do erection and repairing. Will go anywhere. Box 9169

EXCAVATING EXECUTIVE

With 19 years' engineering and managerial experience covering road building, quarrying, dredging and general construction. Desires connection with active outfit that can make good use of a man with practical experience in handling men and machines. For full information write Box 9168

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and speed maintenance are explained. The electrical arrangement of parts is shown by a circuit diagram.

Where to Get: Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania. Free upon request, ask for bulletin DD-4063.

Title: **"Tri-Clad Induction Motors"**

Subject: Interesting highlights on the design, construction, and application of the General Electric line of Tri-Clad motors are dealt with. Well illustrated, concise and graphic in style, the booklet literally takes the motor apart to show how extra protection has been built into the Tri-Clad line of motors. Typical industrial applications also included.

Where to Get: General Electric Company, Schenectady, New York. Free upon request, ask for bulletin GEA-3580.

Title: **"Timken Bearings in National Defense"**

Subject: The way in which Timken Company met its responsibility, the vital importance of Timken bearings and steel in the machinery used for making defense equipment and the necessity for these products in defense equipment are discussed quite thoroughly in this thirty-one page book. Profusely and interestingly illustrated.

Where to Get: The Timken Roller Bearing Company, Canton, Ohio. Free upon request.

Title: **"Hydraulic Bullgraders and Bulldozers"**

Subject: Complete description of Bucyrus-Erie's new line of hydraulic bullgraders and bulldozers for International TracTracTors is contained in this 24-page bulletin. Sixty photographs, plus drawings and diagrams "tell all" about construction details and design features. Actual field action shots tell the story of features turned into performance on the job. Complete specifications are given.

Where to Get: Bucyrus-Erie Company, South Milwaukee, Wisconsin. Free upon request, ask for bulletin BGD-6.

Title: **"What Users Say About Caterpillar Diesel Power"**

Subject: "What the other fellow says," is always interesting. With that in mind, an attractive 16-page booklet dealing with statements users make regarding "Caterpillar" diesel power was published.

Where to Get: Caterpillar Tractor Company, Peoria, Illinois. Free upon request.

Title: **"Airflex Couplings"**

Subject: This booklet contains typical installation views, a complete discus-

Brace Yourself Against Cave-In Losses!

Cave-ins and slides are hazardous—retrenching and cleaning-out is costly — avoid them all with Simplex *Drop Forged* Trench Braces. Ball and socket joints at ends permit quick adjustment and tight gripping at off-angles. Available with blunt lever nuts or 3-way nuts for use with separate lever. Made in 14 sizes from 16" to 60" long in closed position. Ask your supply house.

Bulletin Industrial-41 covers trench braces, timber braces and other Simplex time-saving, cost-cutting jacks for contractors.

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Simplex Jacks
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Speed and *More Speed* is the cry on construction jobs and industrial projects.

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sion with example illustrations of the Airflex Coupling "Rubber Loading in Shear" principle, dimensions, drawings and tables of each type of coupling, and an easy to follow section on "How To Select Falk Airflex Couplings."
Where to Get: The Falk Corporation, Milwaukee, Wisconsin. Free upon request, ask for bulletin No. 8100.

Title: "Regular Inspection Saves Wire Rope Dollars"
Subject: Helpful information on wire rope inspection and illustrations of common causes for wire rope failure. In it several wire rope constructions are shown with recommendations for use.
Where to Get: Macwhyte Wire Rope Company, Kenosha, Wisconsin. Free upon request.

Title: "Die List on Compo Oil-Retaining Porous Bronze Bearings"
Subject: Covers sleeve, flanged and thrust bearings. "Length sizes" are specified "any length up to." The actual number listed is multiplied by the fact that intervening lengths between the sizes specified can be ordered. In other words, the lengths up to the maximum lengths specified on each size in the die list can be varied.
Where to Get: Bound Brook Oil-Less Bearing Company, Bound Brook, New Jersey. Free upon request.

Title: "Eye and Face Protectors"
Subject: A completely illustrated and explanatory catalog covering Sellstrom's new line of safeguards (spectacle, goggle and handshield) together with their general line of safety material. Thirty six pages long with an index to facilitate convenient and quick identification of the equipment interested in.
Where to Get: Sellstrom Manufacturing Company, 615-649 North Aberdeen Street, Chicago, Illinois. Free upon request, ask for catalog 19.

Title: "Cutting the Cost of Progress"
Subject: The use of modern roadbuilding and construction machinery in the development and progress of states, counties, cities and towns, is described in this 20-page booklet. Motor graders, tractors and diesel engines are illustrated on a wide variety of jobs from snow removal to municipal generating plants.
Where to Get: Caterpillar Tractor Company, Peoria, Illinois. Free upon request, ask for form 6531.

Title: "Use of Rubber Tracks"
Subject: A special bulletin that illustrates the commercial applications of rubber tracks, apart from their use on crawler-type military vehicles and combat cars. Combining the long life and durability of rubber with the reinforcing strength of steel, the rubber tracks have varied adaptation for use on industrial, commercial and agricultural vehicles, the bulletin shows.
Where to Get: The B. F. Goodrich Company, Akron, Ohio. Free upon request.

BARGAINS IN USED EQUIPMENT

FOR SALE, RENTALS, BUSINESS OPPORTUNITIES, TRADES, ETC.

To the reader wishing to advertise used equipment in the "For Sale" Section: All advertising in this section is payable in advance. Enclose your check or money order with copy. Rate: 60c per line. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Holding up your advertisement one month to secure approval of revised copy or an additional remittance may cost you real money in a lost sale. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

To the reader wishing to answer "For Sale" Section advertisements appearing on these pages: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

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Up to 2½ Cubic Yards

BUCYRUS-ERIE GA-2 High Lift 1 yd. Shovel. Waukesha WS engine. Single Shaft Cats. Operating condition. Located eastern Pennsylvania. Box 2776

OSGOOD "CONQUEROR" Gas Combination 40' boom dragline and clamshell. Operating condition. LeRoi engine. Located Missouri. Box 2742

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6¼"x8" 4-cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2774

BUCYRUS-ERIE 10-B Gas Dragline and ½-yard drag bucket. High altitude engine. Excellent condition. Less than one year old. Located Montana. Box 2764

NORTHWEST MODEL 105 gasoline caterpillar mounted Shovel. Re-built with late design cats and boom. Good operating condition. Located Washington. Box 2762

LORAIN 40 with one purpose trailer. Two years old. ¾-yd. Shovel and backhoe attachments. In tip top working order. Located Indiana. Box 2779

MARION Model 381 Shovel. Waukesha-Hesselman 6-cylinder 7"x7" engine. 182 H.P. at 1000 R.P.M. 25'6" boom—17'6" dipper handle—2¼-yard dipper. Substantially field reconditioned. Located Chicago. Box 2725

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BUCYRUS-ERIE 46-B with 1½-yd. bucket and 2½-yd. bucket, Kohler light plant, 75 ft. boom, 6-cylinder Buda diesel engine with electric starter. Located Southeast Missouri. Box 2788

BUCYRUS-ERIE GA-2 Gas-Air 1 yd. Shovel. Very good operating condition. Located North Carolina. Box 2708

BUCYRUS-ERIE 55-B Diesel Dragline. 75'-0" Boom. Oversize Cats. Atlas engine. Now operating Kansas. Box 2766

LIMA 1001 Electric Dragline. 60' boom. 2½ yard Heavy Duty Esco drag bucket. 1000' power cable. Motor 200 HP Slip ring type 3 phase 60 cycle 440 volt. Excellent condition. Located California. Box 2747

BUCYRUS-ERIE 50-B Electric Shovel. 30' boom. 17' dipper handle, 2-cu. yd. dipper. 3 motor suitable for power supply 3 phase 25 cycle 440 volt. Excellent condition. Located Southern Wisconsin. Box 2750

BUCYRUS-ERIE 20-B ¾ yard 2 motor electric shovel. Suitable for power supply of 3 phase 60 cycle 440 volt. Now operating. Located Tennessee. Box 2738

AMERICAN MODEL G.S. 1-yard Gas Clamshell. 50 ft. Boom. Waukesha Engine. Good condition and appearance. Located Detroit. Box 2770

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READY TO WORK. K44 Link-Belt crawler dragline-crane. 55' boom, 1¾-yd. drag bucket. Crane capacity 25 tons at 12'. Light Plant. Located Iowa. Box 2756

BUCYRUS-ERIE 10-B Gas Dragline and Crane—28' boom, ⅜ yd. AX drag bucket. Three ton hook block. Independent boom hoist. Buda engine. Used only six months. Reasonable price. Located Kansas. Box 2737